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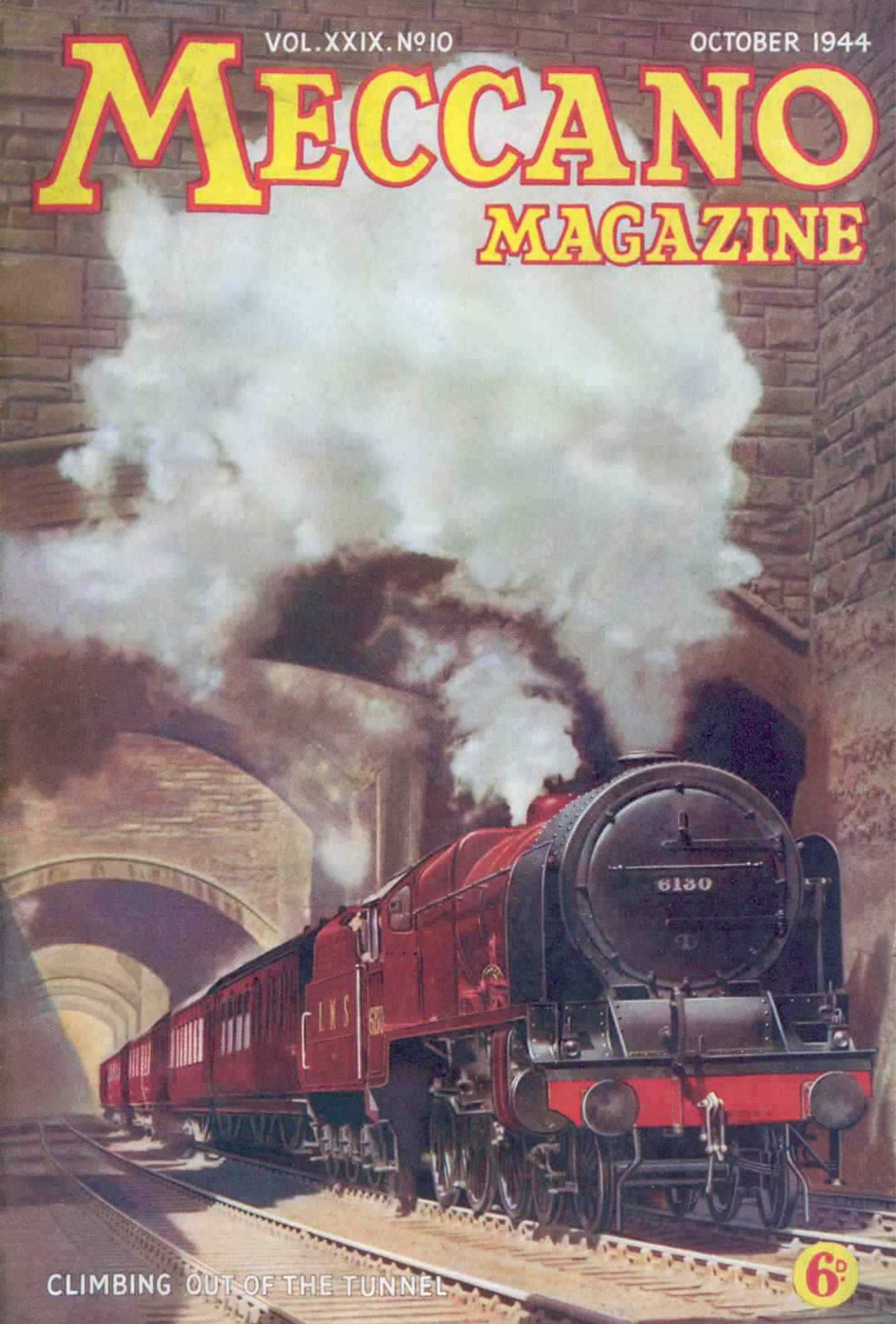
MECCANO MAGAZINE



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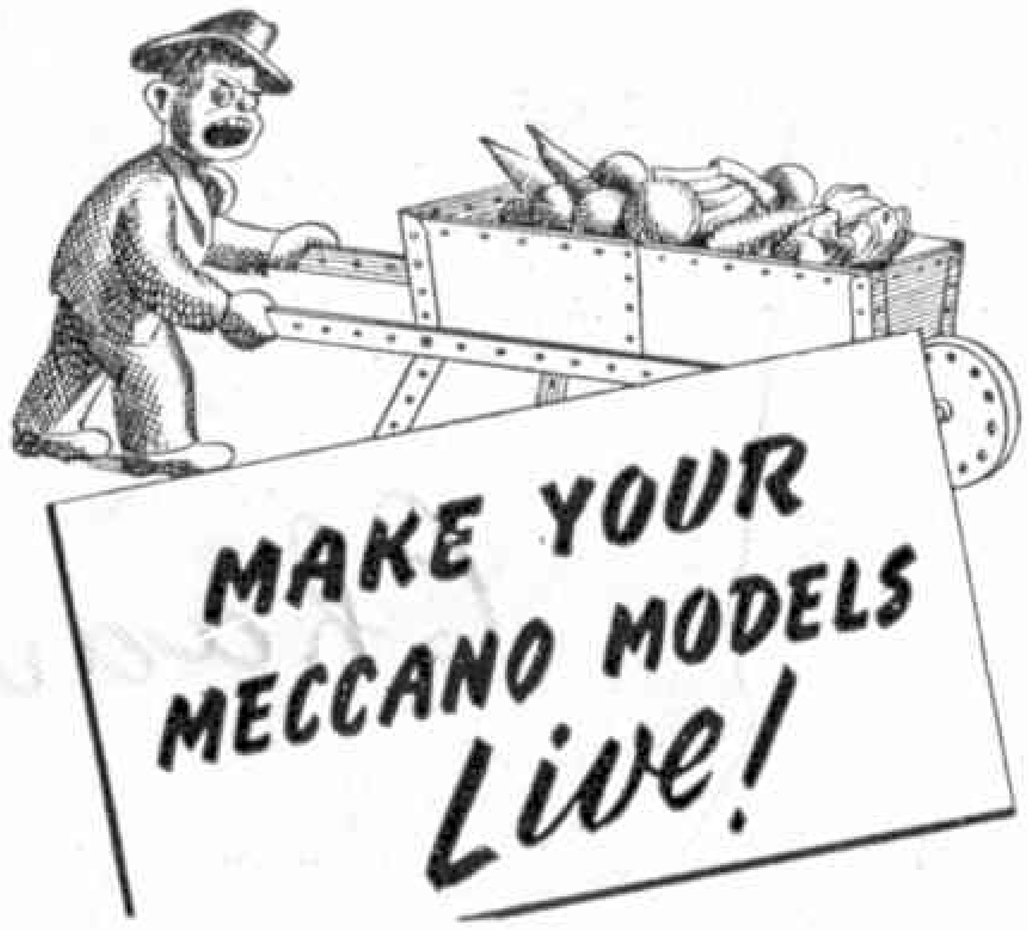

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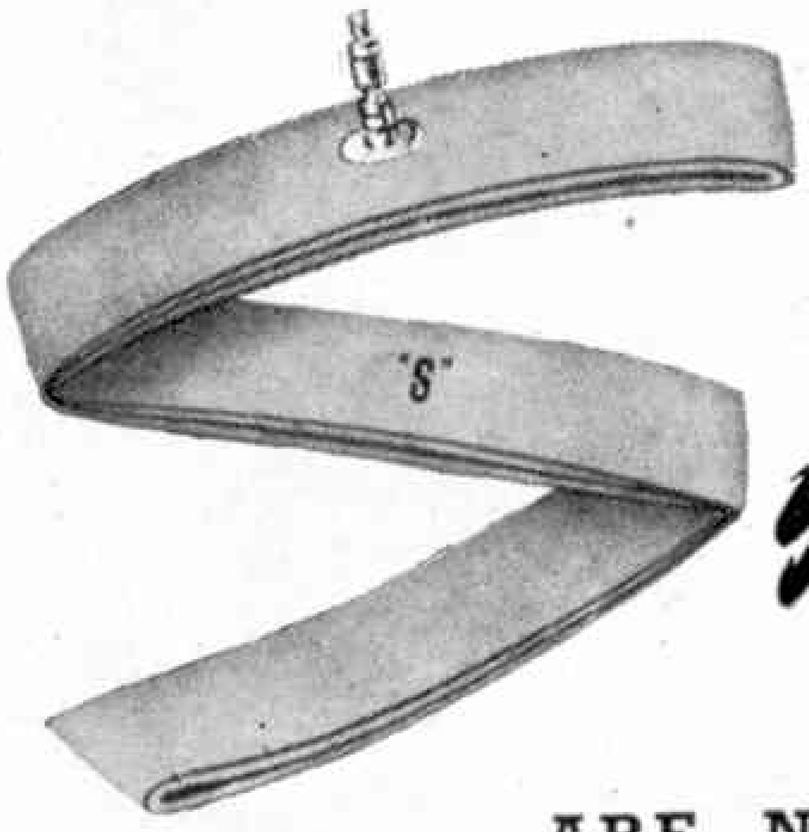

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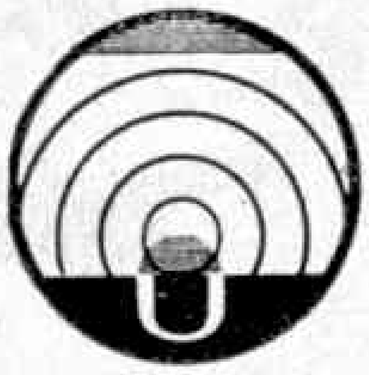

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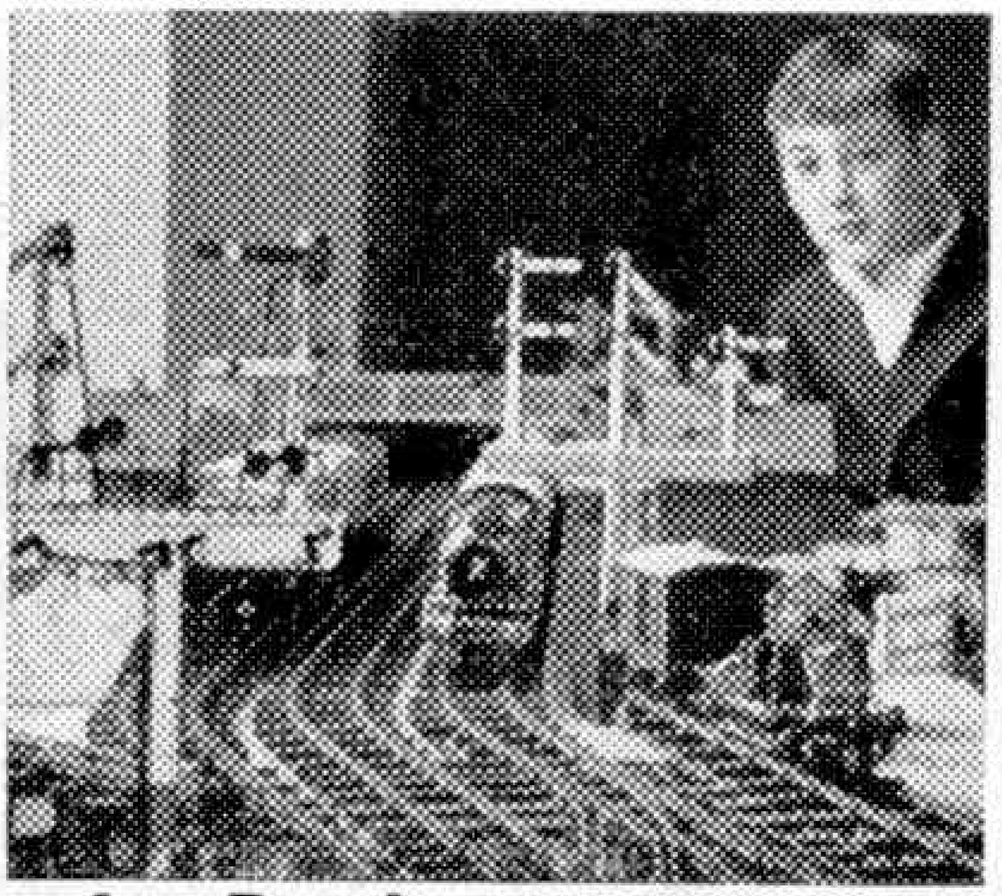

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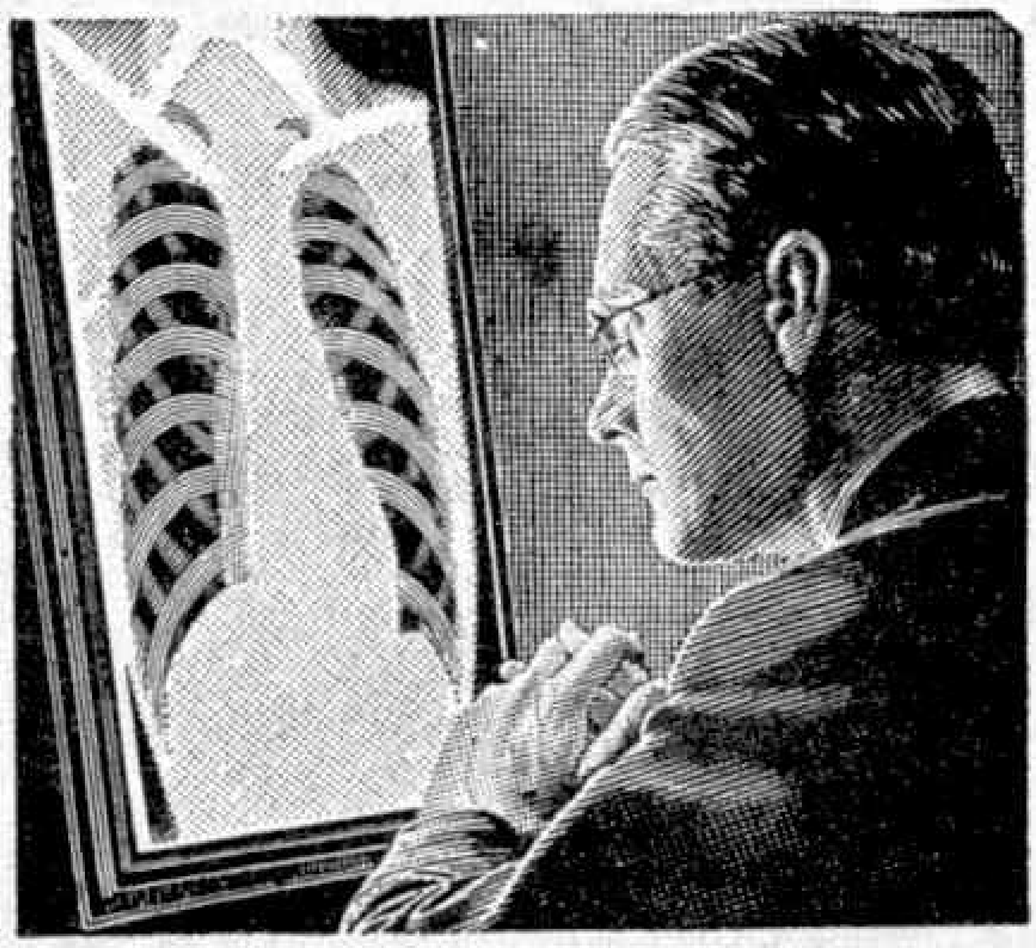

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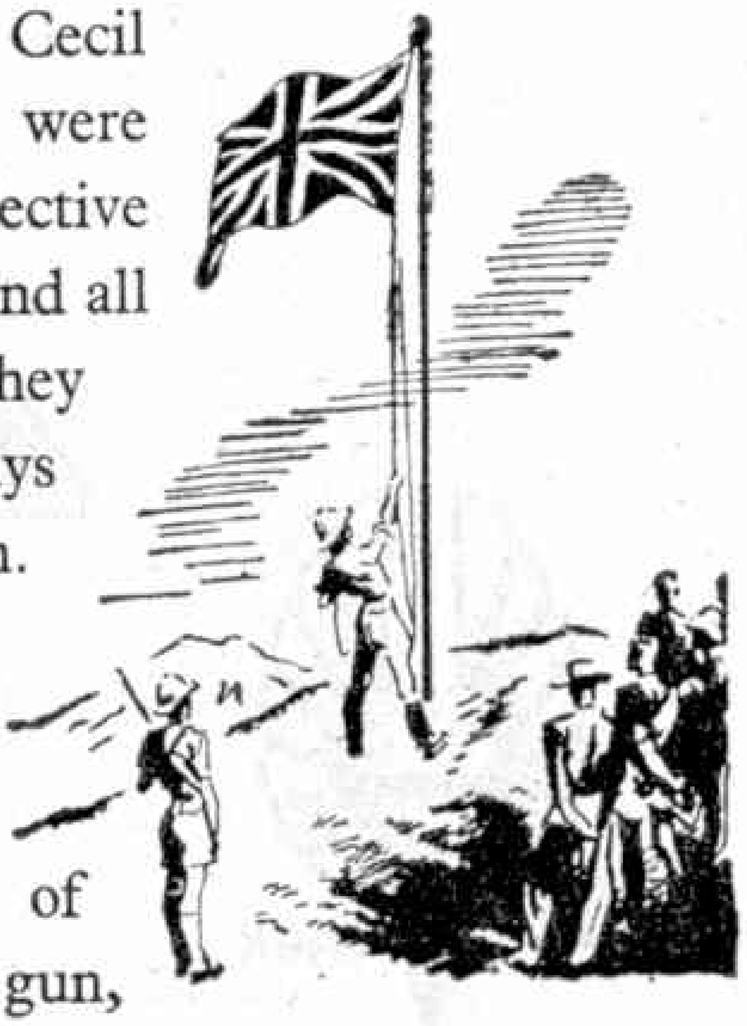

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Next Month: "THE UNITED STATES AIR FORCES." By C. G. Grey

MECCANO MAGAZINE

Editorial Office:
Binns Road
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Vol. XXIX
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October 1944

With the Editor

"The Rare and Secret Order of the Double Sunrise"

A remarkable feat has been accomplished by Qantas Empire Airways in operating for more than a year, under wartime conditions, a regular air service between Western Australia and Ceylon. The service was inaugurated at the request of the British and Australian Governments. It operates over 3,500 miles of the Indian Ocean, and it is claimed to be the world's longest non-stop stage on a regular air route. The crossing is completed in an average time of 27 hours, and extra fuel tanks containing 500 gallons give each aircraft a fuel range of 36 hours. The Qantas "Catalina" flying boats are mostly fitted with Australian-built Pratt and Whitney "Twin Wasps" of 1,250 h.p. The all-up weight of the machine is 35,000 lb., and there are usually three passengers. The average weight of mail and freight is 500 lb.

Much of the flight has to be done during darkness and this adds considerably to the difficulties of navigation; while the regulations imposing radio silence provide a further handicap. Courses are maintained by astro-navigation and this requires both skill and experience on the part of the officers. The crew of each "Catalina" consists of Captain, First Officer, Second Officer, Navigating Officer, Radio Officer and Flight Engineer. After making four return crossings of the Indian Ocean each crew member is entitled to wear the company's Long-Range Operations Star. An interesting feature is that the passengers see the sunrise for the second time while they are still in the air, and each one is issued with a document certifying that he has made the flight and entitling him to the privilege of membership of the "Rare and Secret Order of the Double Sunrise."

The "Catalina" service is being augmented by a faster service, known as the "Kangaroo" service, to be operated by four-motor landplanes.

Moons

To all appearances each month's Moon simply dies after about four weeks and a new one is born. But the Moons do not all behave alike. For instance, after the April Moon is at full it rises about one hour later each day; but the September full Moon advances by only about twenty minutes a day. Thus in September there is evening moonlight for about a week. It is supposed that in early times good use was made of this evening light to get in the harvest; so the September Moon is called the Harvest Moon. This month's Moon, which is known as the Hunter's Moon, behaves in a similar way, and probably got its name from the use made of it by the early huntsmen.

This Month's Articles

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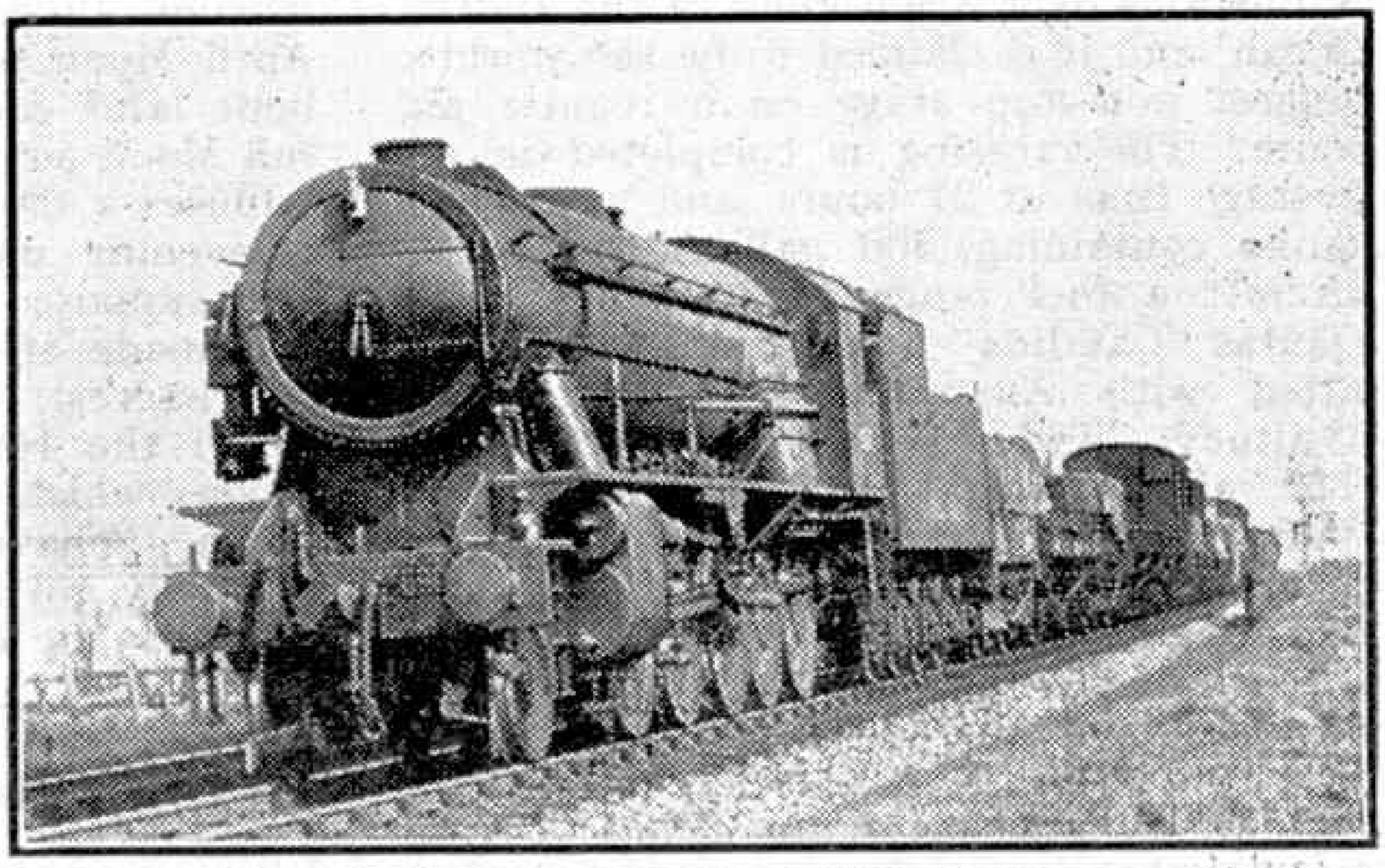
Recent British Locomotive Practice

By O. S. Nock, B.Sc., A.M.I.Mech.E.

IN the past few years we have all become so used to wartime conditions in every walk of life that few people realise to what an extent normal industrial development has been held up. In no industry has the hold-up been greater than in railway passenger transport. The slowing down of main line services took place immediately after the outbreak of war, and it is hardly surprising that not a single new locomotive design, intended primarily for express passenger traffic, has appeared since 1939. At the same time there has been a number of most interesting happenings in the locomotive world, and the new engines built during the war, for both mixed and freight service, include features that may well indicate some of the lines along which post-war development may proceed. There have been the "Austerity" 2–8–0s and 2–10–0s built specially for the Government; Mr. Bulleid's fine "Pacific" engines of the "Merchant Navy" class, which have proved so valuable in hauling huge loads of wartime freight on the Southern, as well as indicating what may be expected of them in the way of real express speed after the war; Mr. Thompson's new 4–6–0s and 4–6–2s on the L.N.E.R., and the adoption of the Stanier 2–8–0 of the L.M.S.R. as a species of British standard freight engine for home service.

Looking at things in a little more detail, it is evident that a considerable change in locomotive policy is in process of being made on the L.N.E.R. Under the late Sir Nigel Gresley's direction three-cylinder propulsion was standardised, and the layout in all cases included the Gresley derived motion for the inside cylinder valve; by this ingenious mechanism only two sets of valve gear were needed to actuate the valves of the three cylinders. But in locomotive engineering, as in everything else, one cannot usually have it all ways, and the derived motion necessarily included a number of levers and pin joints. Further, in the majority of designs the combination levers were connected to the forward end of the outside valve spindles, whereas the actual drive for these spindles came from the rear end. The spindles in passing through the valve chests would be affected by the heat of the superheated steam, and thus in designing a valve mechanism to be driven from these spindles allowance would have to be made for the effects of expansion under heat. All this called for very careful designing, and, it need hardly be added, equally careful maintenance.

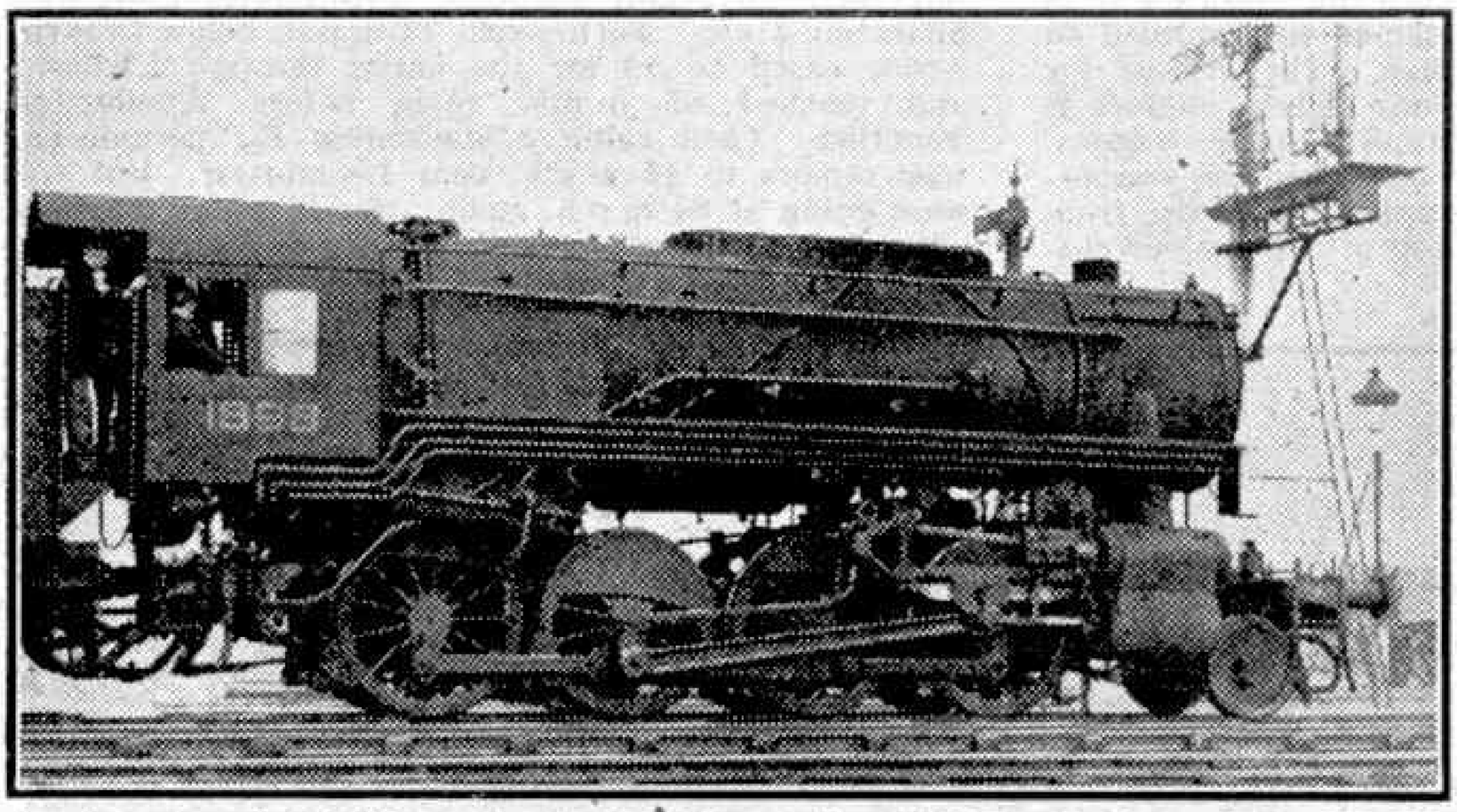
From the experience of many hundreds of miles on the footplates of Gresley locomotives, and many more thousands of miles travelling as a passenger behind them, I can testify to their high efficiency and to their reliability in service. But there are usually two, and sometimes more different opinions about engineering subjects, and the new Chief Mechanical Engineer of the L.N.E.R., Mr. E. Thompson, is clearly no believer in the derived gear. Instead of having to maintain the link mechanism, he prefers to put a third complete set of Walschaerts valve gear between the frames. This is to be seen in his rebuilding of one of the "Cock o' the North" class 2–8–2s, and in a modified version of the "Green Arrow" 2–6–2s now being turned out. But on the other hand it appears that the intention is now to use three cylinders only for locomotives of the greatest power, on which it would not be possible to fit



One of the "Austerity" 2-10-0 locomotives built for the Government at work on the L.N.E.R. Photograph by courtesy of the L.N.E.R.

two cylinders big enough.

This latter tendency shows a decided swing towards American practice, which is to use two cylinders for all locomotives except the huge articulated types. Gresley's advocacy of the three-cylinder system was based upon, among other things, two mechanical features—the more even torque exerted upon the driving axle, and thus



An American-built "War Service" 2-8-0 on the G.W.R. Photograph by M. W. Earley, Reading.

less likelihood of slipping at the start; and the reduced hammer-blow on the rail due to unbalanced forces. Due to this latter advantage one could safely use heavier axle loads than with a two-cylinder engine without fear of creating unsafe conditions in bridges under the line.

Another L.N.E.R. locomotive happening which may have mystified many readers has been the rebuilding of one of the "Cock o' the North" class 2–8–2s as a 4–6–2, and the announcement that the rest of the class are to be similarly treated. Previous articles in the *"M.M.,"* and particularly *"Railway Engineer's"* account of his footplate journeys on the first two engines of this class, must have led readers to think that they were among the most successful of all Gresley designs. So they undoubtedly were—as locomotives. But the Aberdeen road, for which they were primarily designed, is very winding, and although in my own experience they rode very well, they apparently were not always so free from trouble as the majority of Gresley engines. A well-known King's Cross driver told me once that they were "harsh" on the curves, and accordingly Mr. Thompson is rebuilding them as "Pacifics." In the rebuilding opportunity has been taken to alter the valve gear to the arrangement now favoured. The bogie should certainly take them round the curves easier. The same intention is apparent in the modified "Green Arrows" now being turned out, as these are being fitted with leading bogies instead of the pony trucks used in the original engines of the class.

The freight engines built specially for war service have naturally aroused great interest, an interest that has been heightened by the arrival of the American 2–8–0s in our midst. It is certainly a compliment to L.M.S. practice that the Stanier Class "8" 2–8–0 was chosen as a Ministry of Supply standard, and many of these engines, built specially, are doing excellent service in the Middle East. The khaki-coloured "Austerity" 2–8–0s were developed from this design, the engine proper being interchangeable. These 2–8–0s compare in a most interesting way with the latest "Austerity" freight engines, the Ministry of Supply 2–10–0s. At first sight it is rather surprising to discover that both classes have exactly the same nominal tractive effort, 34,215 lb. This is due, of course, to the cylinders, coupled wheels and boiler pressure being the same, and readers may possibly ask why it was necessary to go to the trouble of building a 2–10–0 when it has no greater power than the existing 2–8–0s.

The maximum axle load of the 2–8–0s is 15½ tons. It was required to have a locomotive developing the same power, but having a maximum axle load of only 13½ tons. Reduction in weight could have been effected by putting on a smaller boiler; but such an expedient is clearly out of the question for a locomotive intended for very hard work, and so the logical procedure was to distribute the weight over more axles. This re-distribution enabled a still larger boiler and fire-box to be mounted on the 2–10–0. In this connection it is very interesting to compare the fire-box proportions with those of the American 2–8–0s. The British "Austerity" 2–8–0s have 28.6 sq. ft. of grate area, and so conform generally to the usual practice in this country for

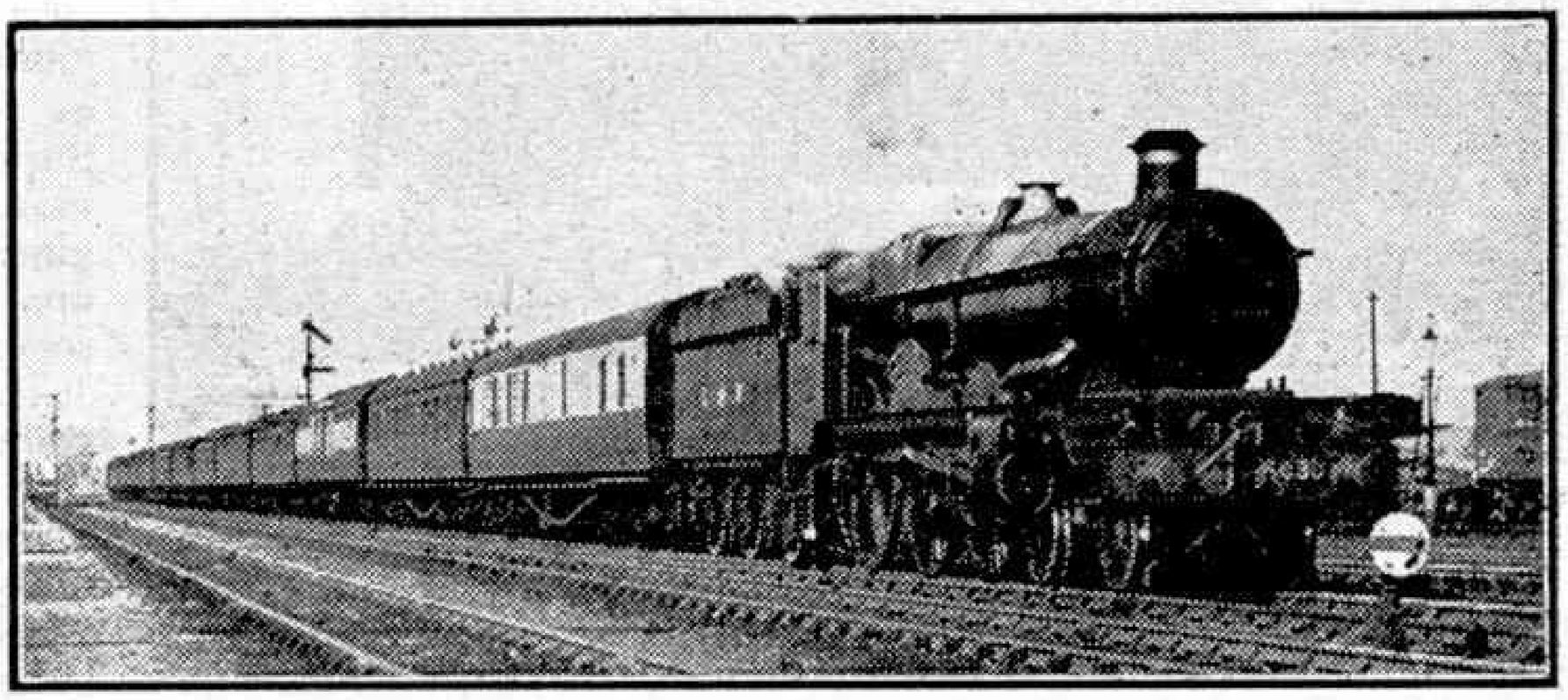
this type of locomotive; the G.W.R. "28xx" class, for example, have 27 sq. ft., and the Stanier 2–8–0s on the L.M.S. have 28½ sq. ft. In striking contrast the Americans have no less than 41 sq. ft.; this would be very useful when having to work hard on a low-grade fuel, and it is perhaps significant that the new British 2–10–0s also have very large grates, with 40 sq. ft. of grate area.

A point about British freight engines that sometimes causes comment is their comparatively small size. Until the construction of the new 2–10–0s the size and power of our biggest goods and mineral engines has hardly increased at all since 40 years ago, when the Great Western first began to build 2–8–0s. The sole exception has been the Gresley 2–8–2s on the L.N.E.R., and these engines are confined to the London-Peterborough section. The reason for this comparative smallness of our freight engines is our continued use of loose-coupled goods wagons. Apart from the use of the hand brakes on the wagons, which of course can only be applied when the train is specially stopped, as at the top of a steep descent the only brakes are on the locomotive and tender, and on the guard's brake van. Under these circumstances it is not safe to work up any substantial speed with, say, a coal train of 1,000 tons; at much over 30 m.p.h. such a train would soon be completely out of control. The highest running speeds with these maximum-load goods trains are about 25 m.p.h., and it does not require an exceptionally powerful locomotive to maintain such speeds, nor to make 10 or 12 m.p.h. up a gradient of, say, 1 in 200.

Another powerful freight locomotive that has attracted a great deal of attention by its remarkably unorthodox appearance has been Mr. Bulleid's "Q1" class 0–6–0 on the Southern. So far as adornments are concerned, this design is "austerity" with a vengeance! Concerning the absence of any running plates, I heard a rather amusing story not long ago. A driver of long experience took one of these engines out for the first time, to work a semi-fast passenger train. Now there is not much that is superfluous in a locomotive cab, and to the engineman the "Q1s" are much the same as any other class. This crew quickly "settled in," and on getting the "right away" from the guard were soon bowling along in fine style. Then the driver happened to look down beneath them, and there in full view, and whirling round at a most disconcerting speed, were the wheels and coupling rod—a sight he had never seen before! The driver himself put it: "It gave me quite a turn"!

As regards passenger train working, my own journeys since the outbreak of war have been confined almost entirely to the Great Western Railway, and I have been greatly impressed by the excellent work of the "Castle" class locomotives. Many of my runs have been over that difficult route from Bristol via the Severn Tunnel, through Hereford to Shrewsbury, and having due regard to the load hauled much of the performance has been little or nothing below pre-war standard. Furthermore, as the war has continued, the work of individual engines has shown no sign of deteriorating, and this speaks highly of their maintenance in difficult conditions. I had a particularly fine trip last Autumn on the 12.5 p.m. express from Shrewsbury to Bristol. The train arrived from Liverpool dead on time behind the celebrated L.M.S. pioneer "Pacific," "*The Princess Royal*," and then the big train of 14 coaches, 465 tons behind the tender, was taken over by the G.W.R. 4–6–0 No. 5032 "*Usk Castle*."

Leaving Shrewsbury on time, we got a bad start on the long rise to Church Stretton, being brought to a dead stand by adverse signals at Bayston Hill loop box. After that we were away in real earnest, reached 43 m.p.h. on the easier part of the ascent, near Dorrington, and fell to 24½ on the 1 in 90 before the summit. On account of the stop we took 29¼ minutes to pass Church Stretton, 12.8 miles, but then we began galloping downhill in most exhilarating style. We touched 75 m.p.h. below Craven Arms, eased to 55 for the curve through Ludlow, and reached 65 m.p.h. again before Woofferton Junction. Then came a slackening for permanent way repairs to 15 m.p.h. near Leominster. But we were going at 64 m.p.h. again after Dinmore, though adverse signals checked us at the approach to Hereford.



G.W.R. 4-6-0 No. 5030 "Shirburn Castle" on an up South Wales express. Note the latest style of lettering on the tender. Photograph by M. W. Earley, Reading.

Due to the three delays our total time for the 51 miles from Shrewsbury was 75¼ minutes; but fully 8¼ minutes had been lost in these slackenings, so that our net time was only 67 minutes, a very fine effort over this hilly road.

Still finer work followed. The climb from the Wye Valley into the Black Mountains comes in two stages—a stiff initial pull out of Hereford, then a nice bit of "running" ground on a gently falling gradient, and then the final ascent steepening to 1 in 100 for over four miles. "*Usk Castle*" sustained 26 m.p.h. up the first climb, and then got away in fine style to reach 66 m.p.h. at Pontrilas. So well was speed maintained up the last ascent that we topped the summit at 29 m.p.h., and passed Llanvihangel station, 19.9 miles from Hereford, in 28¼ minutes from the start. Going down through Abergavenny we had a burst at 77 m.p.h., but speed was carefully reduced for the curve at Penpergwm, and Pontypool Road was reached in 44½ minutes, for the 33.4 miles from Hereford. From Pontypool Road the line falls steeply to the outskirts of Newport, and we had no difficulty in passing Caerleon, 7.3 miles, in 9¼ minutes. Then came the usual very slow and careful negotiation of the Maindee curve to bring us on to the South Wales main line. On the straight and level stretch to Severn Tunnel Junction we worked up to 60½ m.p.h., and were through the Junction Station, 18.8 miles from Pontypool Road, in 25 minutes from the start.

At this point, despite the delays experienced in the first stage of the journey, we were running 3 minutes *early*. Down into the tunnel and under the River Severn we touched 66 m.p.h., and then climbed splendidly up the long 1 in 100 gradient on the Gloucestershire side; speed had not fallen below 28 m.p.h. when adverse (*Continued on page* 358)

Engineering News

A Welding Aid

The illustration on this page shows welders at work on a huge component of a marine engine that is supported on an ingenious manipulator. When such large components are simply propped up, and turned over as required with the aid of cranes and other devices, a considerable amount of time is wasted in handling them. This is avoided by mounting them on the manipulator, which can be tilted to any angle and rotated in order to place them in the most convenient position.

The manipulator illustrated is designed for components weighing up to 20 tons. When it is used for components approaching this weight as much as 35 to 40 per cent. of the total welding and handling time can be saved, and even with structures weighing up to 10 tons there is a saving of a quarter to one-third of the time. The machine was built by Cooke and Ferguson Ltd., Manchester.

The surface of the manipulator, to which the parts to be welded are clamped, is a circular table 16 ft. in diameter and 2 in. in thickness, on which the parts are fixed by means of bolts inserted into slots. The centre of the table can be removed, so that the parts to be welded can be made readily accessible and projecting portions can be placed into the opening. The table can be turned at the rate of 1 r.p.m. by means of a 50 h.p. motor, which acts through a pinion and a pin rack attached to the supports of the table, which turn on rollers spaced around a circle so as to distribute the load. The tilting movement is obtained from a separate 30 h.p. motor, which causes an arm attached to the table to climb up a stationary worm wheel segment mounted on one of the supporting legs. The legs are 6 ft. in height. As the table has a radius of 8 ft., this means that it is supported excentrically, the part above the tilting line being greater than the part below when the table is vertical. This plan has been adopted to give good access to the parts being welded and generally to improve the characteristics of the machine.

The manipulator is placed on the edge of a pit 14 ft. in depth, so that components with a length greater than the diameter of the table can readily be handled. Work pieces up to 44 ft. in length can be dealt with on it, and by suitable choice of position on the table jobs from 10 tons to 27 tons can be dealt with.

Push-button starters are used for the two motors. When the appropriate button is pressed each motor starts operation and this continues so long as the button is held down. When it is released electro-mechanical brakes stop the movement.

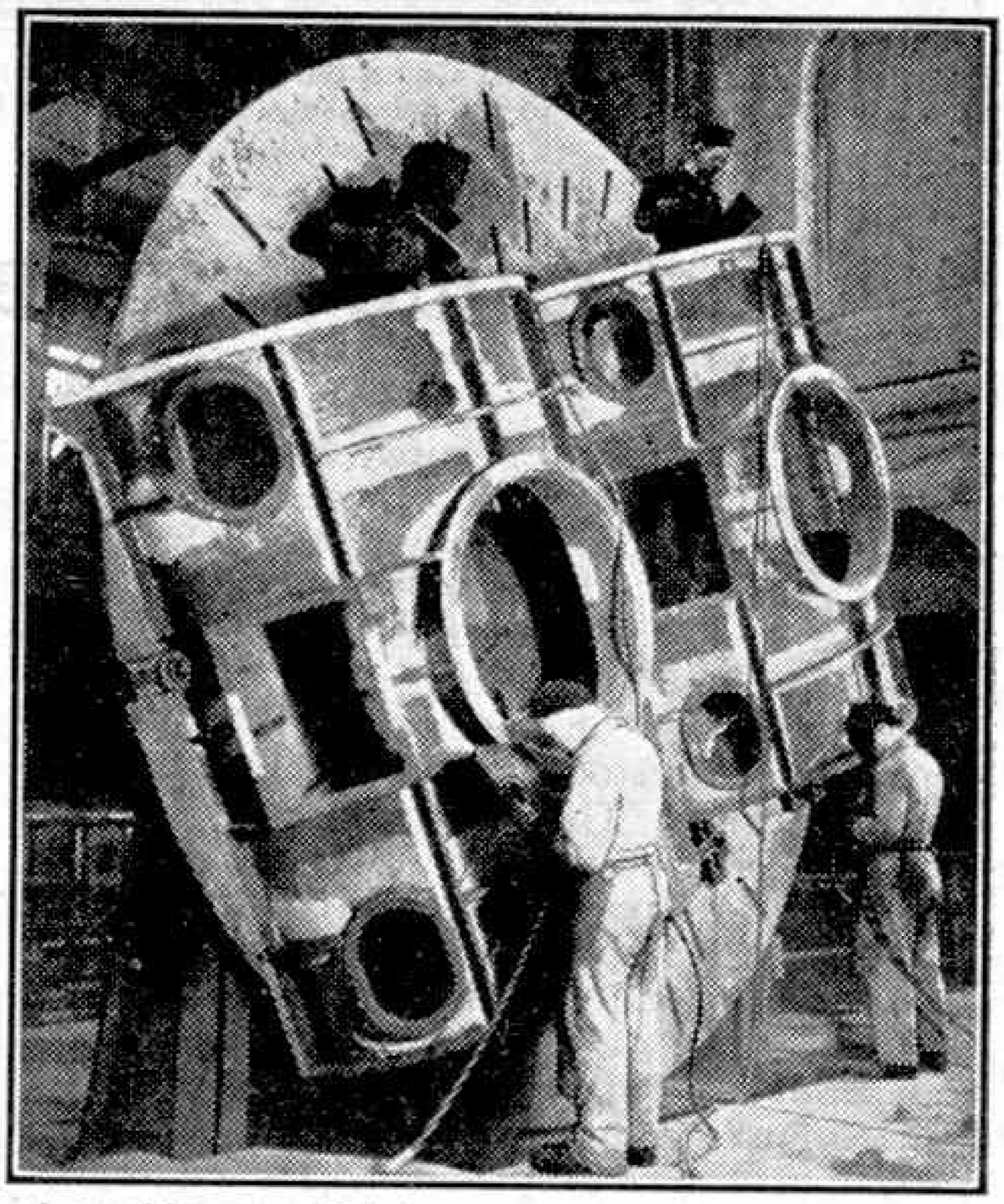
A Great Mountain Road

One of the world's most spectacular highways, from Lima on the Pacific coast of Peru to Oroya, has been carried farther inland by almost equally spectacular methods and now links the coast with Pucallpo. This town is on a river that flows into the Amazon at Iquitos, at the head waters of the Amazon, and on which a regular service is maintained. The total distance between Lima and Iquitos is 1,172 miles, and the trip from end to end can be made in five days, two by motor and three by boat. Formerly this was a 30-day journey by mule and canoe, and it was so difficult that many travellers preferred to go round by way of the Panama Canal, down the Atlantic coast to the mouth of the Amazon, and thence the necessary 2,300 miles upstream, a journey almost 10 times as long.

The section of the road from Lima to Oroya, which has been in service for several years, twists and turns through steep canyons and rises to a height of 16,000 ft., greater than that of Mont Blanc and four and a half times that of Snowdon. The continuation that has now been completed carries the road across two other ranges of mountains, and at one point follows a route through a narrow canyon 6,000 ft. in depth, which was discovered nearly 200 years ago by a Franciscan missionary and then completely forgotton. The canyon is three miles long and in places only 300 ft. in width, and it was necessary to complete three bridges and to bore three tunnels in order to carry the road through it.

A Dam in Lapland

A dam built to regulate the flow of the Lule Alv, one of Sweden's largest rivers, is now in service. The reservoir behind it covers about 110 sq. m. at high water level. The site is about 100 miles north of the Arctic Circle, and in winter materials had to be transported to it by sledge. The workers' barrack town was several times cut off for weeks by blizzards.



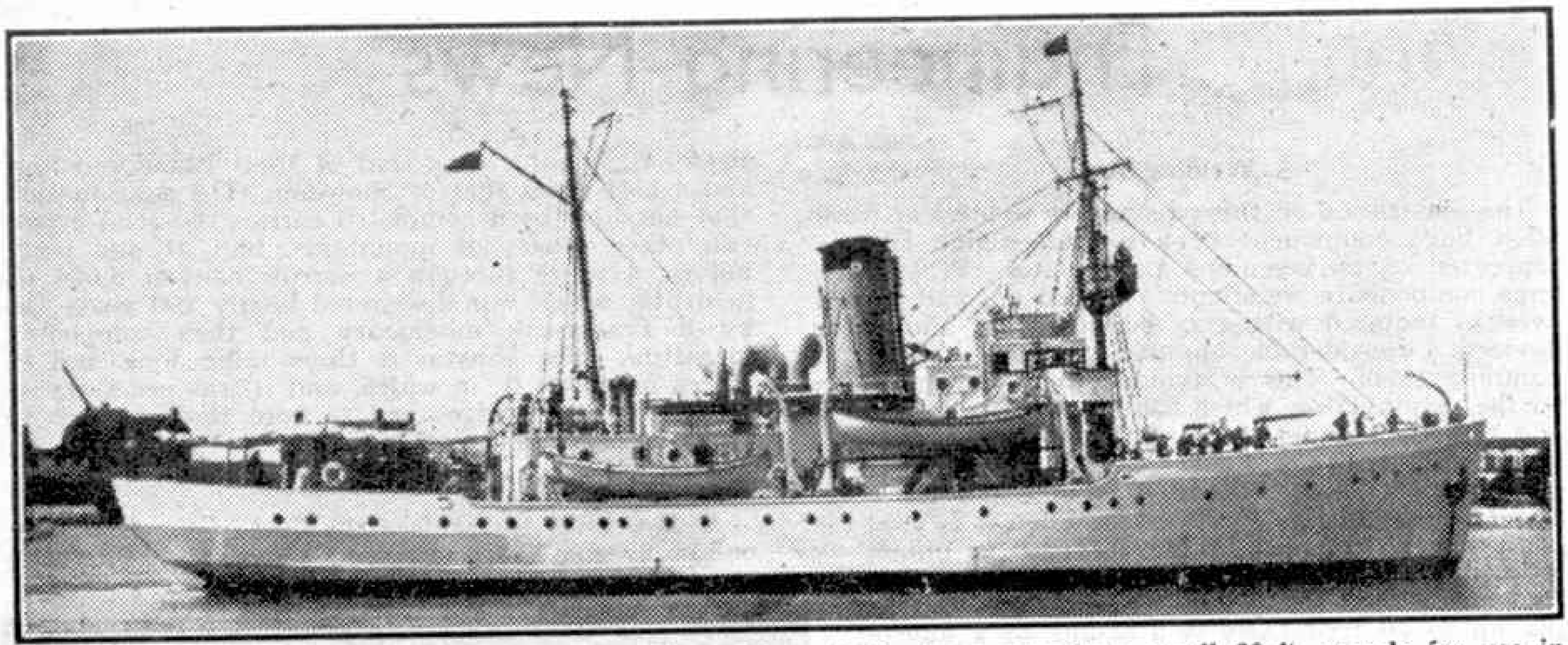
A machine on which heavy parts requiring welding can be turned into the required positions with the least delay and inconvenience. It is called a manipulator and has been designed and constructed by Cooke and Ferguson Ltd., Manchester, to whom we are indebted for our illustration.

Novel Bridge Lighting Scheme

An interesting plan for safer lighting on bridges has been tried out in California. The lights are concealed under the hand rails of the bridge, on which are continuous lines of reflectors so that the sidewalks and road surfaces are brightly illuminated. The great advantage of the system is that drivers are not dazzled, yet have a perfect view of the road.

* * * *

An electric motor only 13 in. long and 5 in. in diameter, but developing 30 h.p., has been made in the U.S.A.



A United States 165-ft. Coast Guard cutter. The cutters of this force vary from small 60 ft. vessels for use in rivers and harbours to sea-going ships with a length twice that of the cutter shown in our illustration.

The United States Coast Guard

By M. Lorant

IN time of war, the United States relies for protection upon three regularly established military forces, the United States Army, the United States Navy and the Marine Corps, and the United States Coast Guard. The status of the U.S. Coast Guard in time of emergency is not so generally understood as that of the Army and the Navy. The Coast Guard is more frequently looked upon as America's peace-time maritime police force, but it has well defined and purely military duties.

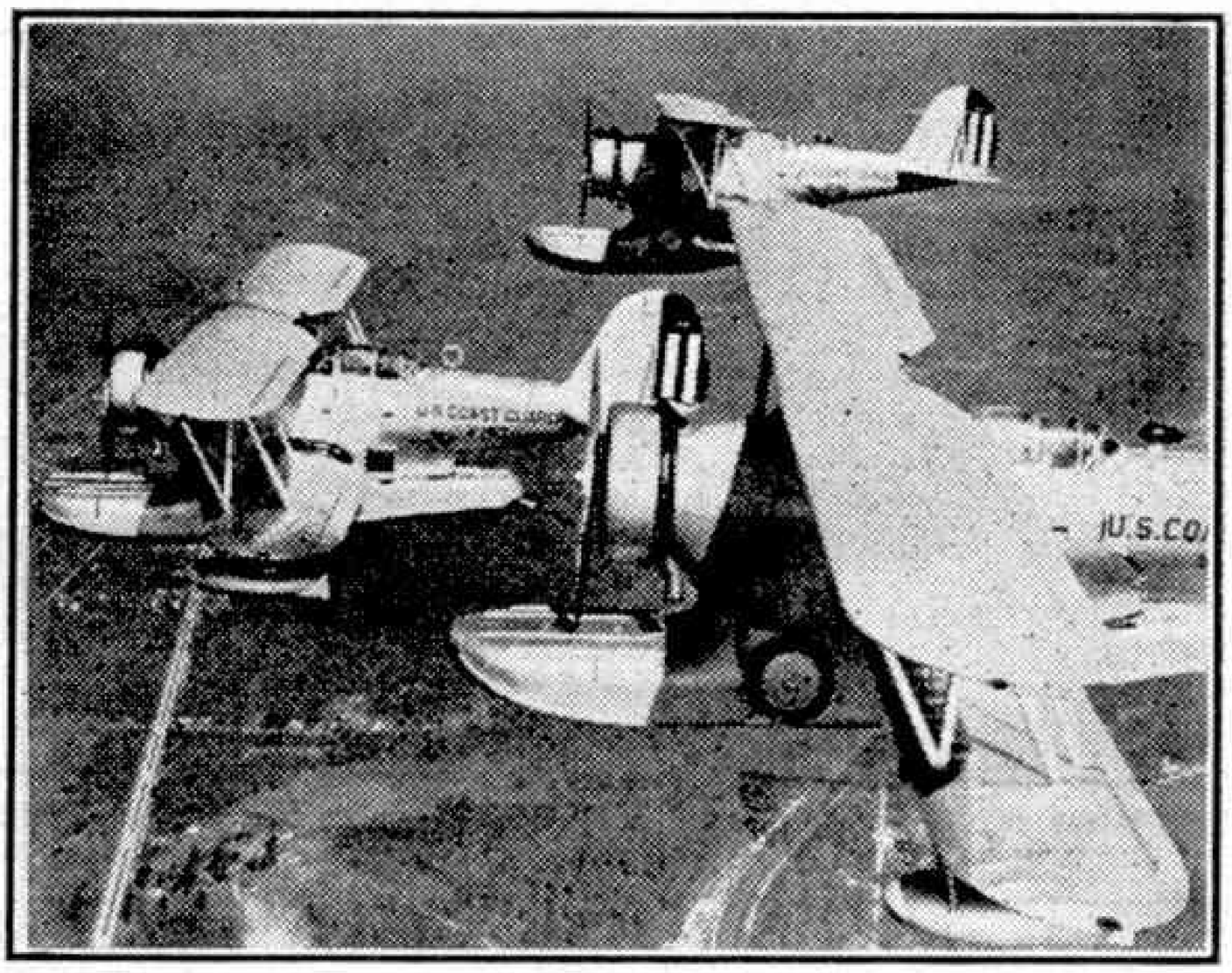
When Alexander Hamilton became the first Secretary of the U.S. Treasury after independence had been gained he found the infant republic's financial affairs presented a serious problem. He realised that the skill in smuggling that the colonists had developed was being applied to the evasion of the payment of the young nation's custom duties. He appealed to Congress to provide for the construction of 10 revenue cutters and Congress authorised the establishment of such a fleet. This force was the beginning of the Revenue Marine or Revenue Cutter Service, forefather of the U.S. Coast Guard. Its primary duty was the prevention of smuggling, but as there was no organised Navy at the time and an Act authorised the President of the U.S. to employ the cutters to defend the sea coasts, and to repel any hostility to the vessels and commerce of the United States, so their duties were also military in character.

In co-operation with the American Navy, the U.S. Coast Guard has served with marked distinction in every war in which the United States has been engaged, and its history is full of incidents of distinguished service in defence of the country. In the sea-going branch of the Coast Guard, the cruising cutters are armed, a high state of efficiency is maintained in drills with rapid-fire guns and small arms, and complete naval discipline is maintained.

The Coast Guard stations, formerly life-saving stations, are placed at intervals along the entire coast line of America. The warrant officers and enlisted men at these stations are, through long experience, admirably trained in maintaining a careful watch over all vessels within their sight, and in promptly transmitting intelligent information regarding the movements of vessels and unusual occurrences within their observation. Coast Guard stations are linked up with the Coast Guard communication system, and information from the stations can be transmitted to Washington promptly and efficiently. With the exception of a few staff officers, all commissioned officers of the Coast Guard are graduates of the Coast Guard Academy, where they have pursued a course of instruction similar to that given at the Naval Academy. Most important of all, the Coast Guard personnel is imbued with military tradition and a fine esprit de corps, the inevitable result of high ideals and devotion to duty covering over a century and a quarter.

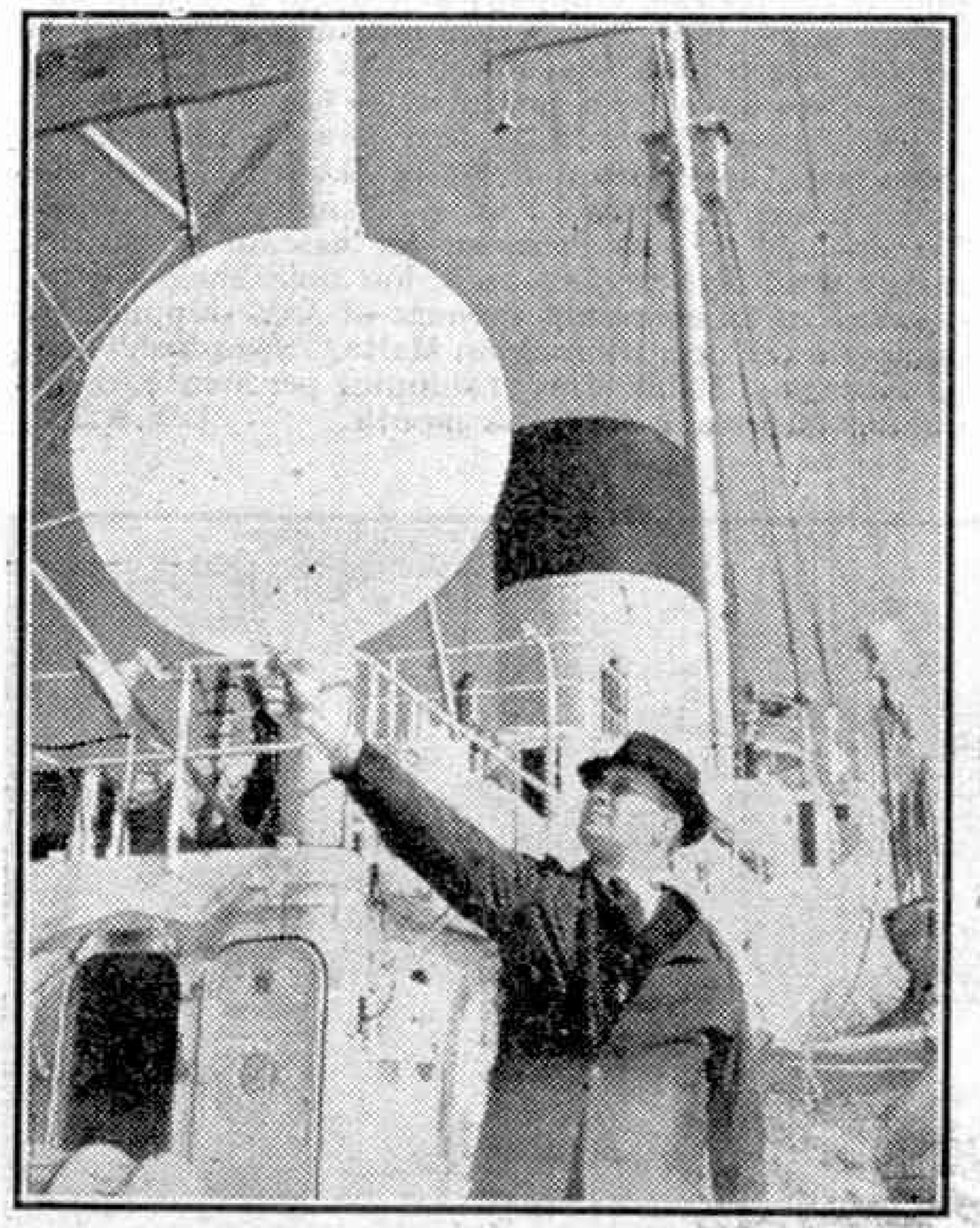
The Coast Guard maintains a fleet of cutters for the performance of its many

duties upon the sea and the interior waterways of the country. These cutters vary in size and equipment from the largest type of sea-going ship, 327 ft. in length and strongly armed, to small ships of 60 ft. for use in rivers and harbours. Practically all cutters are armed, in order to carry out duties in wartime. All crews are trained in the saving of life and property; the larger ships are equipped for ocean towing, and many of the smaller ones have unusually high speed to enable them to overhaul lawbreakers. There are special types of ships for the laying of submarine cables, and a large group of vessels designed for the handling of buoys and maintaining other aids to navigation.



A formation of United States Coast Guard aircraft. Grumman amphibians on patrol.

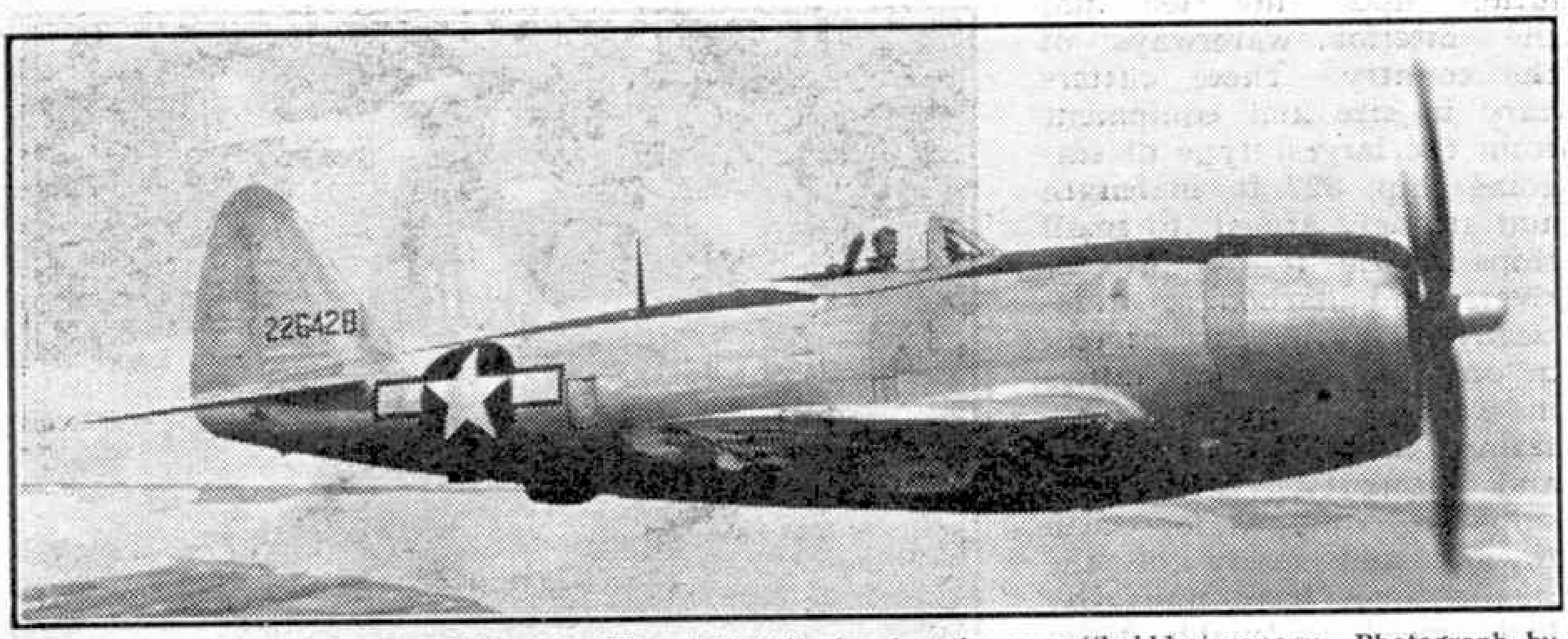
The Coast Guard also maintains an adequate air force, the primary purpose of which is the saving of life and property along the coasts of the United States and its possessions, the general work with which the Coast Guard is charged, and the maintaining of patrols. The service first turned to aviation as a means of augmenting its shore and floating plant in 1916, when Congress authorised the establishment of 10 Coast Guard air stations, but substantial progress was not made until 1926. To-day the service has a number of modern air stations in operation, and its aircraft include long-range twin-engined patrol seaplanes, intermediate range twin-engined amphibians, inshore patrol single-engined machines and several others of special types. All are equipped with the most up-to-date radio facilities.



A pilot balloon used to carry recording instruments to heights up to 30,000 ft. The recordings are used in weather forecasting.

The Coast Guard also have charge of 500 fully attended lighthouses. These mark the Atlantic and Pacific coasts of continental United States, the United States waters of the Great Lakes, and the waters of Puerto Rico and adjacent United States islands, Alaska, and the Hawaiian Islands. There are also 31 lightship stations on various parts of the American coast, all maintained by the Coast Guard.

A substantial number of medium-sized ships, frequently referred to as patrol boats from the nature of their duties, also are included in the Coast Guard's fleet of cutters. But one of the main duties of the Coast Guard is maintaining ocean-going cutters on stations lying between the United States and Europe, in the general vicinity of Bermuda and the Azores, for the purpose of supplying information on mid-ocean weather to the United States Weather Bureau. Ships assigned to this duty carry trained weather observers and specialized equipment for the work in hand.



The latest version of the Republic P-47 "Thunderbolt," showing the new "bubble" canopy. Photograph by courtesy of Republic Aviation Corporation, U.S.A.

Air News

An Improved "Thunderbolt"

A new "Thunderbolt" is in action in both the European and Pacific war zones. It is basically similar to earlier versions of the type, and has an 18-cylinder Pratt and Whitney "Double Wasp" engine, but it has been developed by the Republic design staff in co-operation with U.S.A.A.F. engineers. An improved system of water injection has had the effect of adding several hundred horse-power for emergency use in combat, and greater internal fuel capacity gives the new "Thunderbolt" double the range of early models, so increasing its value as an escort fighter. The paddle-bladed propeller has added some 400 ft. per min. to the climbing speed. Another new feature is the electrically-operated "bubble" hood, similar to those of the "Typhoon" and "Mustang," which gives the pilot an almost unobstructed view in every direction.

The oxygen capacity has been increased by 50 per cent. to cater for the extra range, as, owing to the machine's turbo-supercharger, the engine develops its full power at well over seven miles up. The armament remains the same, eight .50 in. machine-guns. A 1,000 lb. bomb or four rockets can be carried under each wing for fighter-bomb sorties.

The new "Thunderbolt" is being built for the Air Forces of Britain, Russia and Brazil, as well as for the U.S.A.A.F. J.W.R.T.

North Atlantic Return Ferry Completes 1,000 Flights

On 7th September last British Overseas Airways celebrated the completion of 1,000 flights on the North Atlantic Return Ferry, one of the most remarkable air services in the world, and the only North Atlantic service of any country to operate continuously through three winters. The origin and operation of this service were described in the November 1943 "*Air News*." During the three years the Return Ferry service has been in operation it has carried 332 tons of mail, 528 tons of freight, and 11,378 passengers; and there has been only one fatal accident.

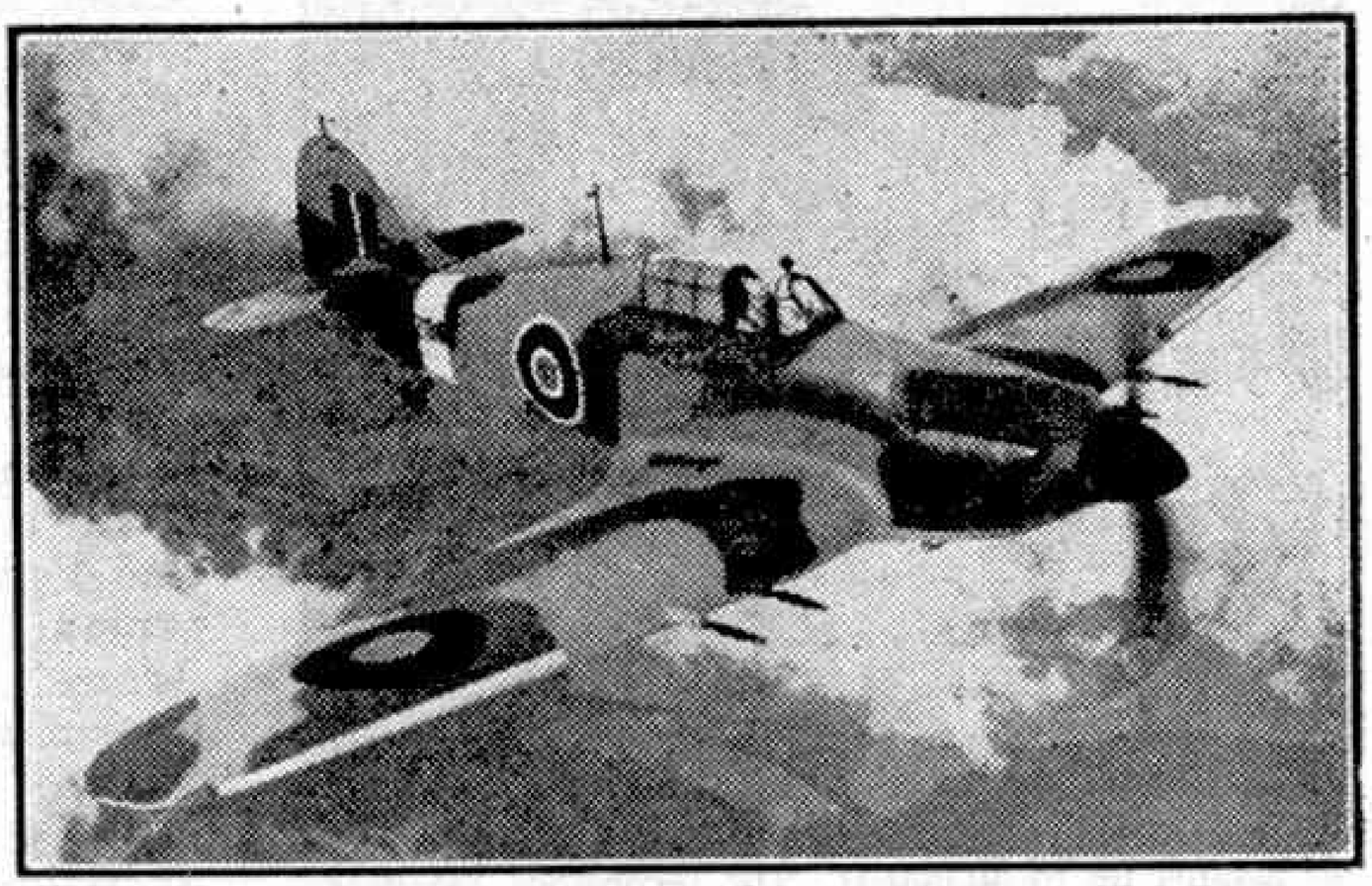
British Overseas Airways also operate a regular ocean service across the middle and South Atlantic, with 40-ton flying boats.

No More "Hurricanes" and "Swordfish"

Production of two of the outstanding aircraft of this war, the Hawker "Hurricane" and the Fairey "Swordfish," has ceased. The final "Hurricane," a IIc machine and appropriately named "*The Last of the Many*," came off the assembly line on 12th August last. A banner above its fuselage recorded the chief battle honours of this famous Hawker type, which has been in action on 36 war fronts, and another banner listed some of the basic variants of the "Hurricane"—there are over 200 versions in all.

"*The Last of the Many*" was test-flown by Group-Capt. P. W. S. Bulman, seen at the controls in our photograph of this machine in flight, who as chief test pilot to the Hawker Company flew the first "Hurricane" in November 1935. Since then considerably more than 10,000 "Hurricanes" have been built by Hawker alone, and others have been produced in Canada.

The Fairey "Swordfish" first flew in 1935, and a great many have been built by Blackburn Aircraft Ltd. and others by the Fairey Company. Like the "Hurricane" it was designed for ease of production rather than high performance, but nevertheless it has disposed of an enormous tonnage of Axis shipping. In one period of operations from Malta, "Swordfish" sank an average of 50,000 tons of shipping per month, reaching 98,000 tons in the peak month. J.W.R.T.



The last of a famous line. The final "Hurricane" in the air. Photograph by courtesy of Hawker Aircraft Ltd.

Something New in Cylinder Barrel Fins

The interesting photograph alongside this paragraph shows a young war worker from one of the plants of the Wright Aeronautical Corporation, U. S. A., pointing to the newly-designed aluminium fins for the steel barrels of "Cyclone" aircraft engines which give almost double the cooling area provided by the steel fins previously used. The barrel on the left has 40 steel fins cut from the barrel itself, but the one on the right has 60 aluminium fins attached to the steel walls of the cylinder barrel. The greatly increased cooling area provided by these 60 fins, coupled with the fact that aluminium can dissipate heat more rapidly than steel, results in cooler operation and in turn permits more power to be taken from the engine. It is particularly important on military aircraft, where sustained operation is frequently required at high percentages of power.

Steel barrels for "Cyclone" engines. The one on the right has the newly-designed aluminium fins (see paragraph on this page). Photograph by courtesy of Wright Aeronautical Corporation, U.S.A.

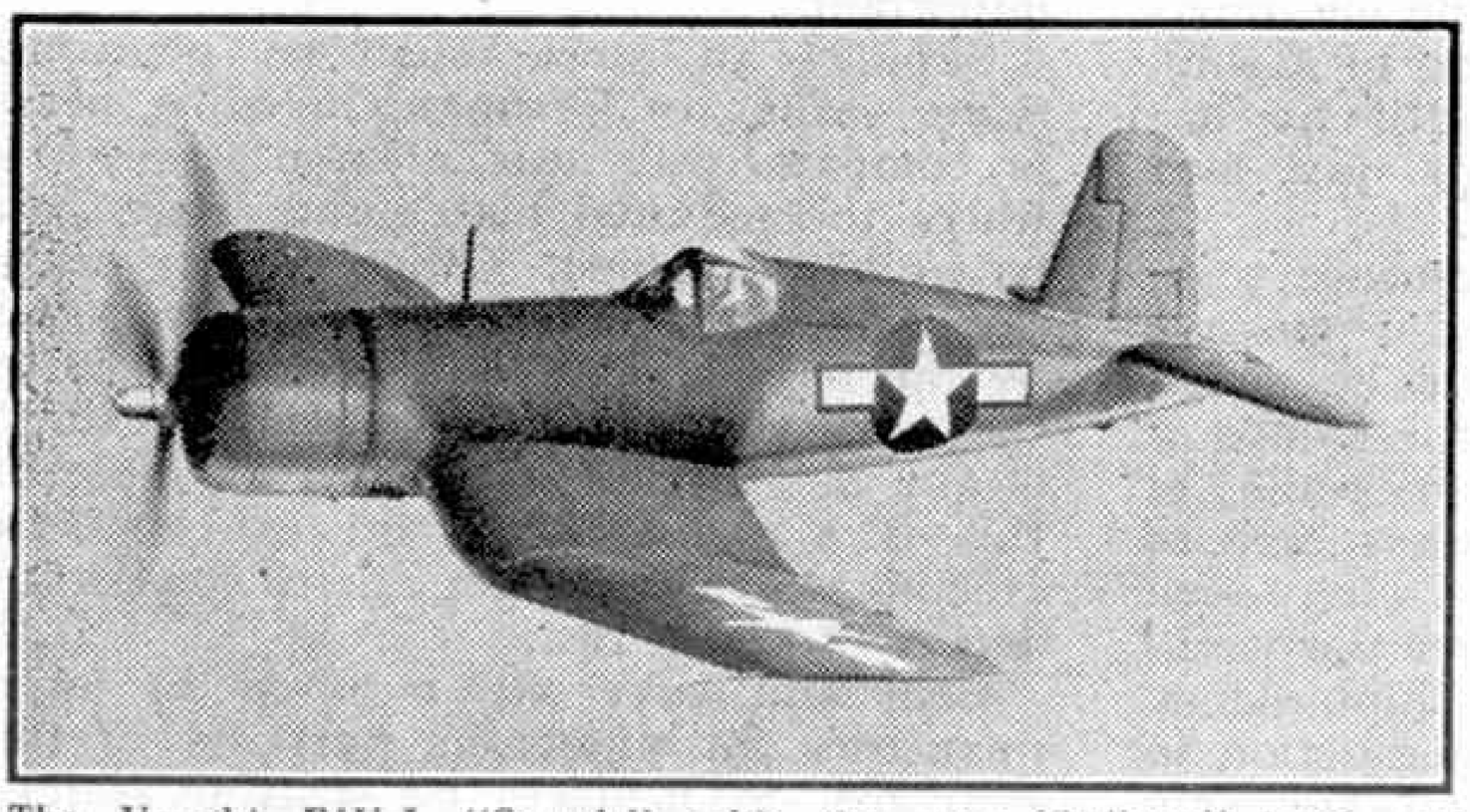
This new barrel does not materially affect the overall weight of the engine, the saving being only 1 lb. per cylinder, but there is a very important saving in the quantity of raw material required, as the rough forging for the new barrel is substantially lighter than that for the older model. In one year's production of "Cyclones" the new fin will save 24,000,000 lbs. of highly critical steel. It has been developed by the Wright Aeronautical Corporation in co-operation with the Scandia Mfg. Co., U.S.A., and is in extensive use; news of it, however, was held up until recently for security reasons.

The Vought "Corsair"

The Vought F4U-1 "Corsair," one of the finest American ship-board fighters to date, is extensively used by both the American and British Navies. In the Pacific war zone in particular the "Corsair" has repeatedly proved its high efficiency. One U.S. squadron equipped with this type shot down 68 Japanese aircraft, with 20 more "probables," for the loss of only three pilots. Another squadron accounted for 104 Jap machines in spite of the fact that its pilots had been trained to fly a different type of machine, and had an average of only 10 flying hours on the "Corsair" before entering combat.

The lower photograph on this page shows one of these machines. It will be seen that the sharply cranked wings give the "Corsair" an unusual appearance. They were designed to keep the undercarriage short in spite of the large-diameter propeller needed to absorb the power of the engine; the backward-retracting legs are hinged at the wing "break." Armament includes six wing-mounted .50 in. machine-guns, and a 500 lb. bomb can be carried under each wing. The top speed is about 400 m.p.h. The "Corsair" II now in service with the British Fleet Air Arm has a "balloon" hood similar to that of the "Spitfire," a 4-bladed propeller, and clipped wing tips.

J.W.R.T.



The Vought F4U-I "Corsair" with the new "balloon" hood and "clipped-tips" to the wings. Photograph by courtesy of United Aircraft Corporation, U.S.A.

New British Aircraft

There is news of three new single-engined aircraft in service with the R.A.F. or Fleet Air Arm, and all Vickers-Supermarine products. One is yet another version of the famous "Spitfire" and designated the Mark XIV. The second is the "Seafire" III, presumably a development of the earlier "Seafire," the F.A.A. version of the "Spitfire," and it made its first operational appearance on D-Day. This new fighter is armed with two 20 mm. cannon and four .303 Browning machine-guns and has a 1,470 h.p. Rolls-Royce "Merlin" engine with a four-bladed propeller. It is fitted with catapult and arrester gear for operating from aircraft-carriers.

The third new machine announced is the "Sea Otter" I, an amphibian biplane designed for reconnaissance, Naval-spotting, and general purpose duties; it has also been used for air-sea rescue work. The "Sea Otter" is armed with three Vickers .303 "K" guns, and either bombs or depth charges can be loaded in the two universal carriers fitted to each lower wing.

* * * *

The first non-stop flight from London to Washington, U.S.A., was made on 19/20th July last by a Douglas C.54 "Skymaster" transport of U.S. Air Transport Command. The 3,800-miles flight took 18 hrs.

The Art of Shipbuilding

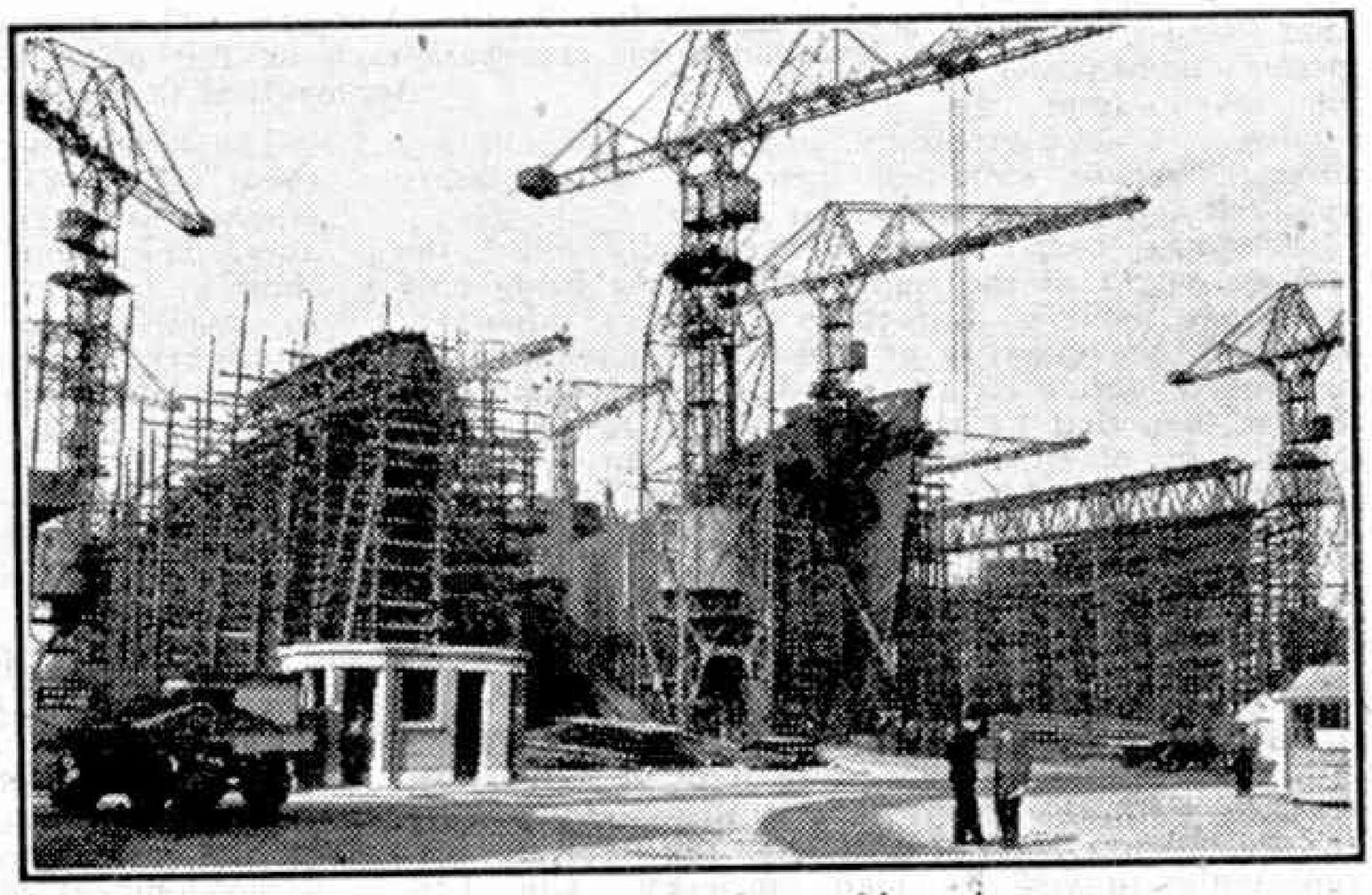
I—The Yard where the Ship is Built

By Denis Rebbeck, M.A. (Cantab.), M.I.N.A., A.M.I.Mech.E.

GREAT BRITAIN depends for her very existence on a large Merchant Navy to carry her trade across the seven seas of the world. This fact was never truer than it is to-day, and the noisy, bustling yards where the ships are built are just as important and necessary to the country as are the ships and the brave men who make up their crews. Few people realise the tremendous amount of work and careful planning that go into the production of those enormous steel hulls which plough their way across the oceans. The progress from the day when the first few rusty steel plates are lined up on the slip and formed into the keel, to the time when the ship glides down the launchways into the water, is one long succession of toil and drive, of team work and concerted action, of leadership and experience — all necessary and all playing their part in the finished ship. It is this pulsating throb of energy which first strikes the visitor when he walks through one of our British shipyards, and though this noisy background may help him to realise, to a certain extent, the enormous effort necessary in the building of a ship, he can never appreciate, until he has worked in one of those yards, just how much laborious toil is needed.

Shipbuilding is a really immense task. Everything about a shipyard is massive and heavy. Everything must be tough and strong, and, from the earliest days of timber ships, those "wooden walls of England," everything has always been of the finest quality. That is why, even to-day, when countries all over the world have become their own shipbuilders, Britain can still claim one distinction in this line, for she can build a better ship than anyone else. This has been amply proved once again, if it were necessary, by the faithful duty which our ships, many of them by no means new, are carrying out on the oceans of the world.

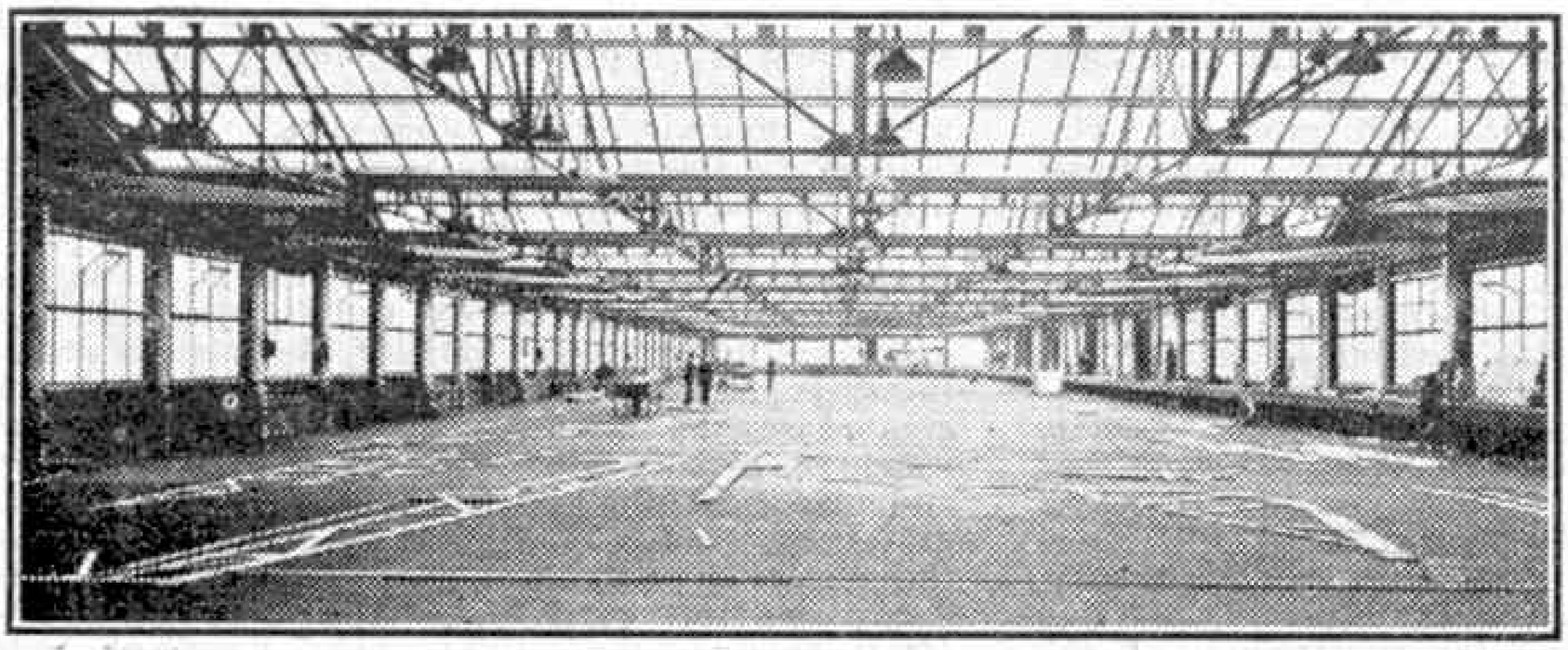
Naturally all shipyards must be near water so that the hull may be successfully launched. Large yards must be near the sea, but small yards can work in very different surroundings, and many are situated on river banks where the peculiar conditions necessitate launching sideways, due to there not being sufficient water for the ship to run normally and be checked to a standstill. There are of course many other considerations to be taken into account, and the following are the most important.



General view of a large shipyard.

Supplies of steel must be plentiful. Some yards are fortunate in being near, or comparatively near, a large steelworks where the required plates and angles can be readily obtained. Other less fortunate shipyards must transport all their material by rail or sea, or both, and consequently they must carry larger stocks in case there is any delay in delivery. An example of this is a well-known yard in Northern Ireland which must get all its steel from across the Irish Sea.

Coal and coke are required in large quantities for numerous purposes in the shipyard—in furnaces for heating frames prior to shaping them; in coke fires for heating rivets (there are enormous numbers of coke fires in a large yard); for heating



An up-to-date mould loft.

boilers which supply steam power and heat to the various shops, and so on.

As more and more electric arc welding is carried out in shipbuilding, the necessity for readily available supplies of electricity becomes obvious. Few places can hope to produce their own power at a figure which can successfully compete with the "grid" system. Electricity is required also for lighting on an enormous scale; as the construction of the ship's hull proceeds, more and more artificial lighting is wanted to help the workers inside the ship in their various jobs. Good lighting is needed more than ever to-day, when severe blackout restrictions have a permanent effect on the natural lighting in the shops and sheds as well as in the administrative offices.

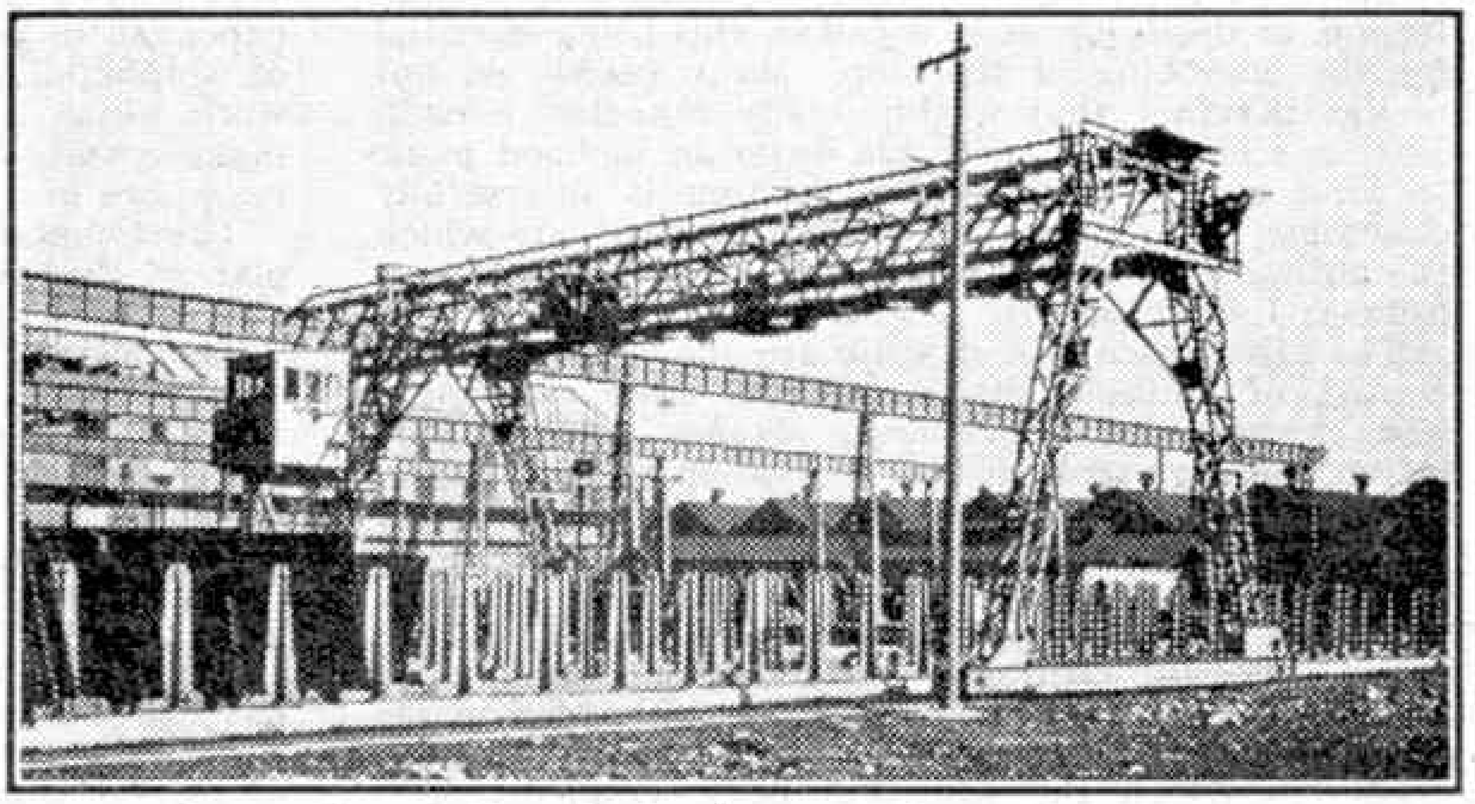
Gas also is required, as are timber, petrol, oil, fresh water, etc.

Last, but by no means least, a plentiful supply of labour of the right type is wanted. Men whose fathers were shipbuilders, and their fathers before them, men whose normal background is the din of riveting hammers, men who are not afraid of a really hard day's work and who understand the requirements of shipbuilding, are vital to the successful operation of a shipyard. The importance of the right type of labour in shipbuilding cannot be overemphasised.

Then there is the management. The present-day shipbuilder, to be successful, must be a man of highly trained technical mind, as he has to face innumerable problems. In the old days vessels followed closely on the lines of their predecessors; progress was gradual, both in construction and in design, and very different from the intensive application of new ideas that are being continuously introduced into modern shipbuilding.

Shipyards themselves are now splendidly equipped with overhead cranes and other means of handling material at the quickest possible speed with the minimum of labour. In the sheds we find one-man punching machines for plates, multiple punching machines, multiple drilling machines, etc. Pneumatic plant is used for riveting, drilling, caulking, etc., and in recent years large developments have taken place in electric welding. The use of these various machines will be indicated further on in the article.

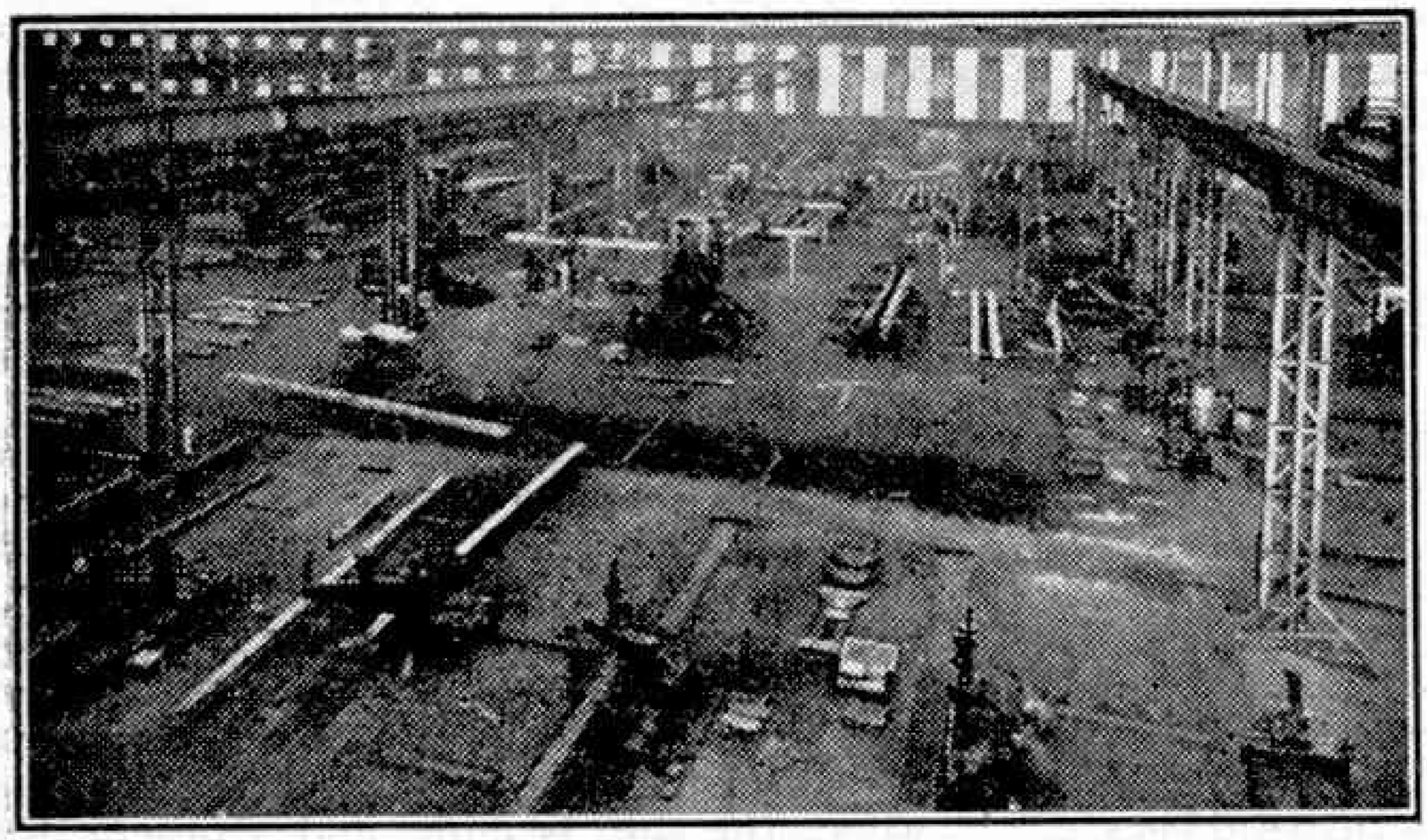
Shipyards are the assembly point for the output of many branches of engineering, such as steel mills, foundries and machine shops. Upholsterers, joiners, etc., also contribute their share in the building of new ships, and form an important part in the construction of passenger liners. The focal point of all this work is the slip where the ship is built, and a description of the birthplace of a large steel hull will be of interest and assistance in obtaining a true picture of a shipyard. In actual fact the slip itself is probably the most important part of a yard, because it is here, after all, that the actual building takes place, and it is from here that the successful launching of the enormous mass of steel will be carried out. Slips may be over 1,000 ft. in length, but an average figure is about 500 ft.



The stockyard, showing gantries and racks.

In constructing a slip the most important factor is the strengthening of the ground to take the large concentrated weights which the slip will have to bear as the building of the hull proceeds. This strengthening is obtained by driving a very great number of timber piles about 50 ft. long into the ground, and then laying large timber beams across the tops of the piles along the slip and across the slip, all suitably joined and connected so that a huge table, as it were, with many legs, is available to carry the load of the ship.

Another type of slip has concrete piles and concrete beams. The piles are reinforced with mild steel rods and are generally of the "Vibro" or the "Precast" type; the surface concrete is reinforced with steel channels about 6 in. by 3 in., and mild steel rods, giving the slip a very clean appearance; and providing the piling is adequate and the construction of the slip has been carefully supervised, the berth will last an indefinite time.



The platers' shed.

All slips are built so that they have a certain incline, or declivity, as it is called, this being essential for the launching of the ship. Many people do not realise the fact that a ship really launches herself, just as a flat object will slide down an inclined plane so long as the coefficient of friction is successfully overcome. The figures for a medium-sized slip which the author has in mind in a certain British yard are as follows: Length 500 ft., Width 70 ft., Declivity $\frac{3}{8}$ in.

The other essentials of a slip are above ground, and consist of suitable lifting facilities such as cranes and gantries and, of course, staging poles. These latter are large straight tree trunks up to 80 ft. long, and over 80 ft. if spliced, which are placed right round the slip, and which carry the staging planks upon which the men work as they build the ship, not unlike the staging required in the building of a house, though naturally larger and in far greater numbers. The stage poles, then, are embedded in the ground and braced together, forming a sort of huge cradle in which the ship will be assembled. Steel trestles also are used for the same purpose.

As slips are generally at the edge of tidal waterways, they are subject to the inconvenience of flooding at their lower length every high tide, the tidal rise in one particular yard being about 8 ft. 6 in. average, while the highest spring tide on record there is 15 ft. 6 in.! Naturally this flooding causes considerable inconvenience to those men who are working at the bottom end of the slip, and many shipyards have gone to the trouble and not inconsiderable expense of building portable cofferdams to shut off the water from the slip and thus enable the workmen to carry on their work irrespective of the state of the tide. These cofferdams are, of course, taken away just before each launch and replaced immediately afterwards. Where several slips are situated together, side by side, they are separated by concrete causeways so that when one slip has its cofferdam removed flooding will not occur in all the other slips.

In every shipyard there is a large shed which at first appearance might seem to be empty, but which in actual fact is a very busy and important part of the yard. This is the mould loft, and it is the place where the drawings go from the drawing office, and where are drawn down, full size, the various parts of the ships' hulls. These lines are drawn in chalk with great care and accuracy on the floor of the loft, which is specially laid, consisting of perfectly smooth and blackened planks. In this place, then, the blue prints are transformed into full-size drawings and this naturally takes up a lot of room; a particularly fine mould loft which the author has seen is over 450 ft. long and about 100 ft. wide. Excellent electric lighting and a very even temperature, maintained by numerous heaters consisting of hot water radiators and electrically-driven diffuser fans, are necessities in a place like this, and in this huge shed a few dozen men work unceasingly on the development of the ship's profile.

Once these chalk lines are drawn down for various parts of the hull, long strips of wood from 3 in. to 12 in. wide and $\frac{1}{16}$ in. thick are laid along the lines and carefully nailed together so that they form a full-size template of each particular part. These templates serve as patterns from which the framing of the ship, in later stages of construction, will be prepared. They must be carefully handled, and when finished with must be carefully stored in case they are needed again, at some future date, for a repeat ship. They are naturally very valuable, as much time and money have been expended in their manufacture. This particular phase of shipbuilding might almost be compared to the work which a tailor does when he uses patterns to make a suit, and the precision needed when making templates in a mould loft cannot be over-emphasised.

The templates are taken, when completed, to the platers' shed, where they are used in marking off the steel frames to the required curvature, etc.

The platers' shed is really the "manufacturing shop" of the shipyard, and contains many interesting types of machines which "work up" the steel to be used on the slip. In this shed we find planing machines, punching and shearing machines, drilling machines, mangles, furnaces, etc., while as might be expected in such a building, where heavy weights and awkward lifts have to be handled, there are many overhead travelling electric cranes running up and down each bay and working at full pressure to satisfy the never-ending requirements of the innumerable squads of platers working down below. A brief description of these different machines in the platers' shed is given in a later article which describes the actual working of the steel plates, channels, angles, frames and beams as the construction of the vessel proceeds.

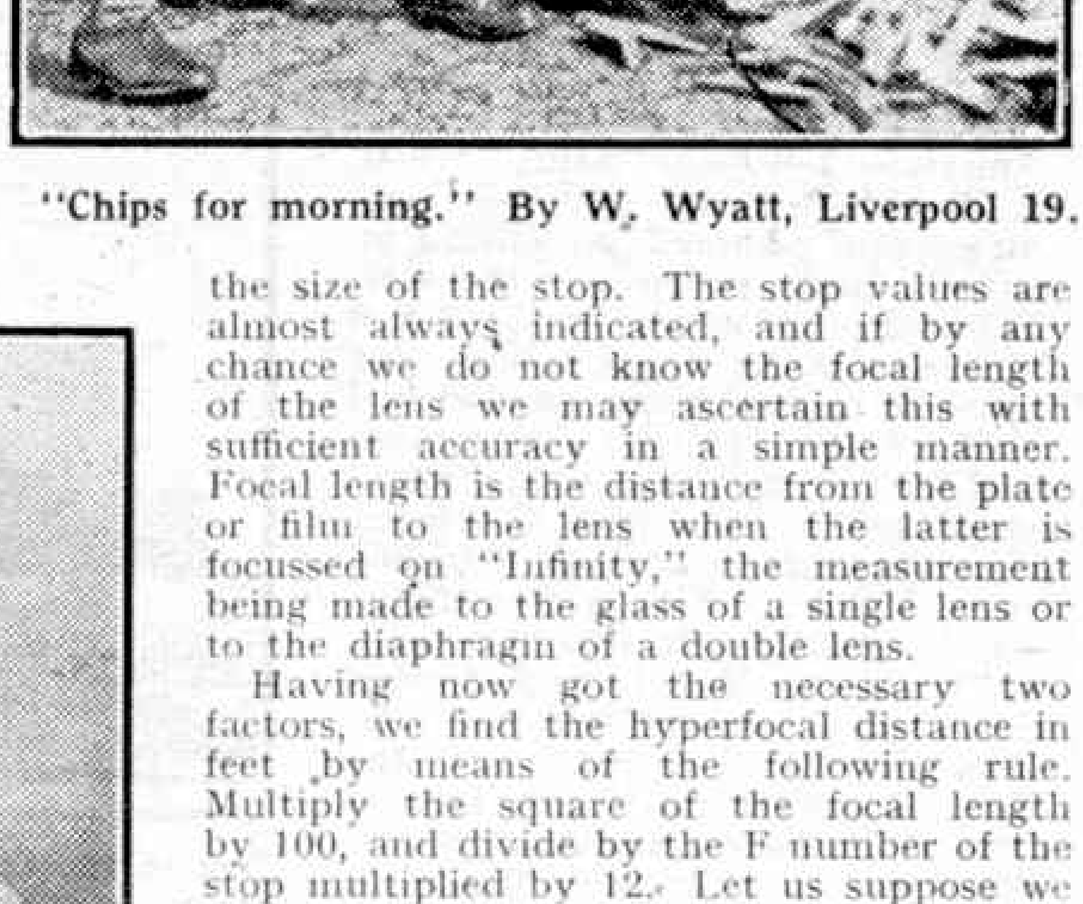
A comparatively little-heard-of part of a shipyard is the steel storage area known as the material storage yard or stock yard. Here all the steel plates and sections are sorted on arrival, and carefully numbered and stored in their respective racks so that they can be readily obtained when required. Hundreds of vertical "stabs" or steel angles are placed in rows to make the racks, while overhead travelling cranes, or mobile steam-driven jib cranes, move about in the stock yard, sorting, lifting and lowering the thousands of pieces of steel (*Continued on page 358*)

Photography

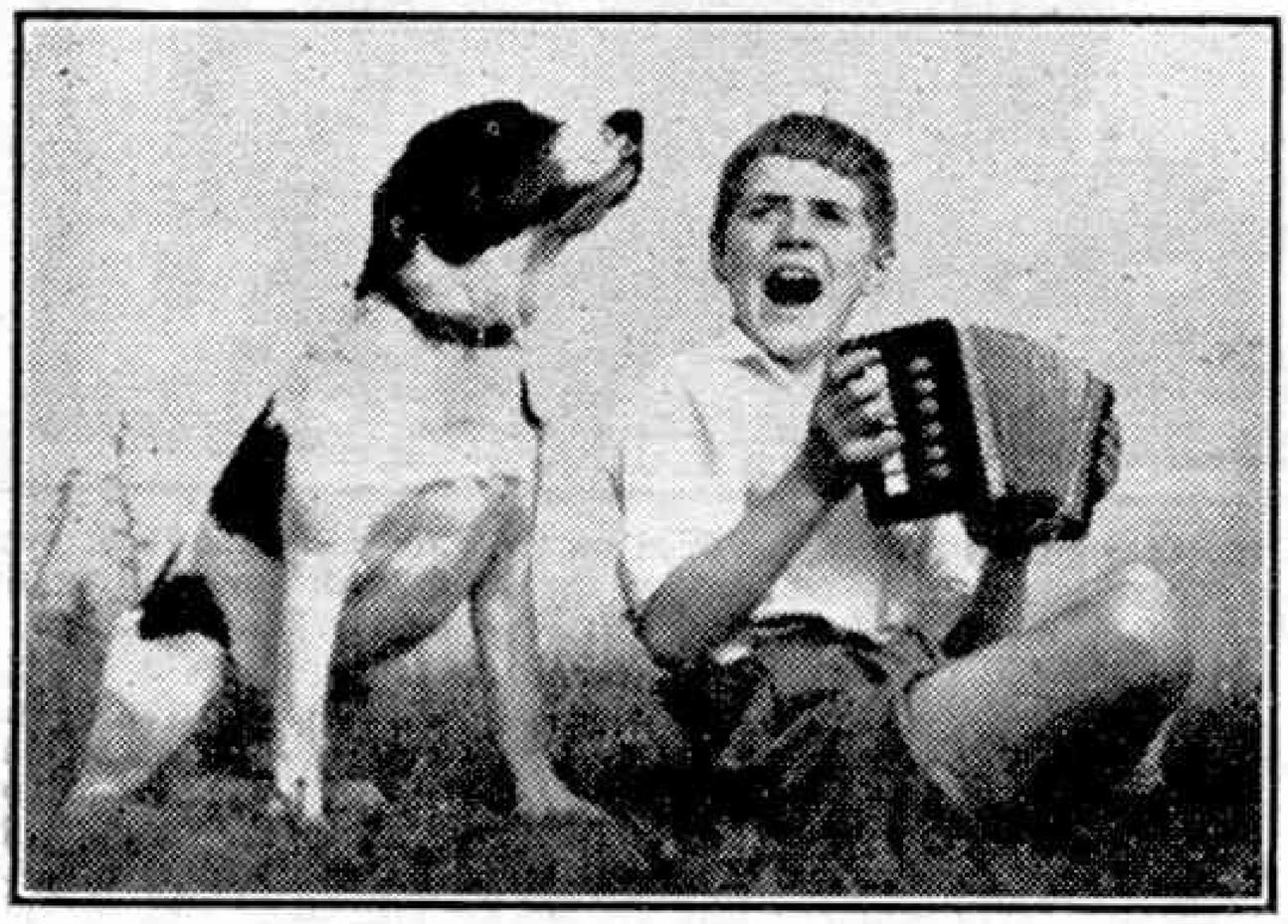
A Note on Focussing

A LARGE proportion of photographic readers have folding cameras fitted with a scale of distances for focussing. Suppose our camera has a focussing scale marked for distances of 6, 9, 15 and 25 ft., and beyond them with the letters "Inf.," meaning "Infinity" or extreme distance. If we wish to photograph an object at a distance of 25 ft. we move the pointer along the scale until it is opposite the 25 ft. mark. All that then remains is to make sure that the camera is 25 ft. away from the subject, but that is not always easy. Sometimes we can measure the distance, or estimate it fairly accurately by striding it out. Often, however, all we can do is to estimate the distance by means of the eye, and this is by no means easy, even after a good deal of practice. Fortunately there is a margin of error in focussing that makes this problem of distance estimation much less difficult.

If, for instance, we set the focussing scale to 25 ft., any object photographed at exactly that distance will appear perfectly sharp, but in addition the object may be moved a certain distance nearer to the camera or further away from it without any appreciable loss in sharpness. This distance through



"Chips for morning." By W. Wyatt, Liverpool 19.



The Duet. By C. W. Lang, Sevenoaks.

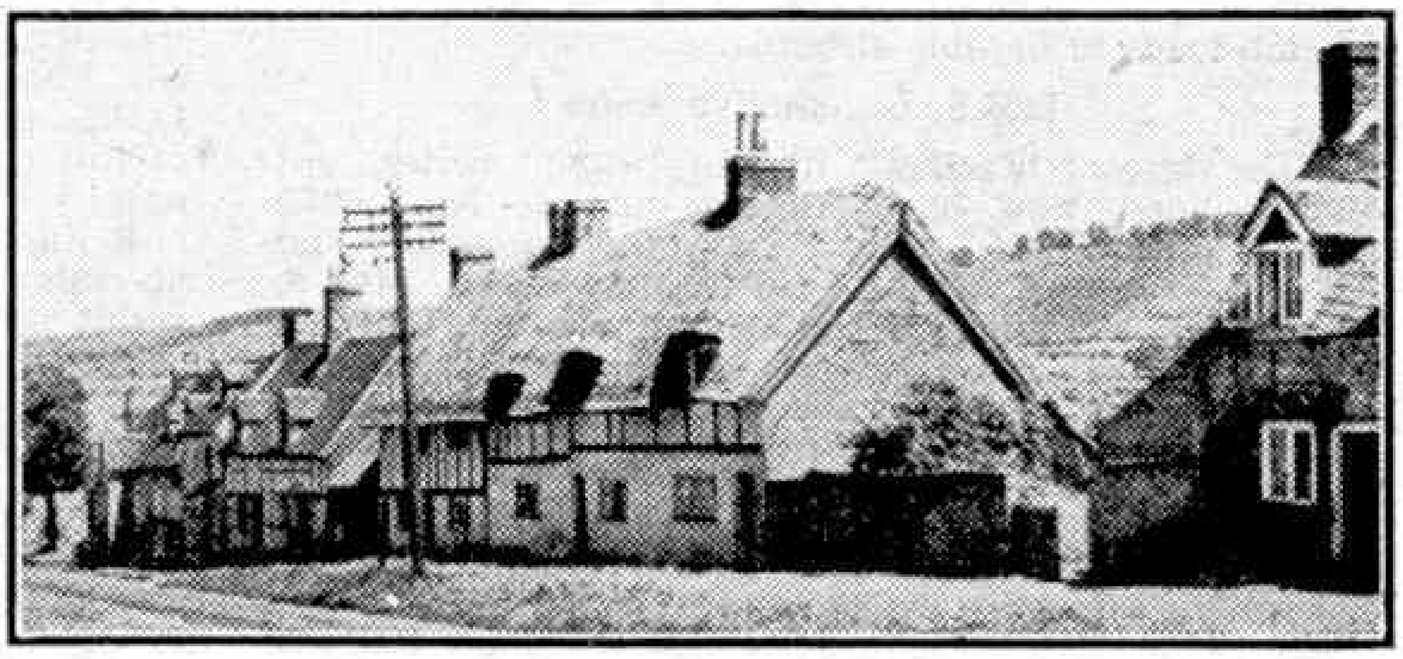
which a focussed object may be moved to or from the camera, while still remaining sharply focussed, is known as "depth of focus," and it is a very valuable asset to the photographer.

Depth of focus or depth of definition is dependent upon the focal length of the lens and the size of the stop employed; and in using a camera fitted with a focussing scale it is very helpful to know the point on the scale at which the indicator should be placed in order to secure the greatest depth of definition. This distance on the scale is known as the "hyperfocal" distance, and it varies with the focal length of the lens and the size of the stop in use.

The hyperfocal distance may be calculated very simply provided we know the focal length of our lens and the size of the stop. The stop values are almost always indicated, and if by any chance we do not know the focal length of the lens we may ascertain this with sufficient accuracy in a simple manner. Focal length is the distance from the plate or film to the lens when the latter is focussed on "Infinity," the measurement being made to the glass of a single lens or to the diaphragm of a double lens.

Having now got the necessary two factors, we find the hyperfocal distance in feet by means of the following rule. Multiply the square of the focal length by 100, and divide by the F number of the stop multiplied by 12. Let us suppose we are using a lens of 5 in. focus and an aperture of F/8. First of all we square the focal length, which gives us 25, and multiplying this by 100 we get 2,500. We then divide this figure by the F number multiplied by 12, in this case 96, and the result, ignoring a small remainder, is 26. We now know that the hyperfocal distance for our lens when we are using the stop F/8 is 26 ft.

And now that we have captured our hyperfocal distance, (*Cont. on page 358*)



An English Scene. By F. C. Reynolds, Sidcup.

Railway News

Great Western Tidings

New engines noted include 0–6–0 pannier tanks up to No. 4681; also "Halls" of the latest modified type, numbered 6963–7. More U.S.A. and L.M.S. 2–8–0 freight engines are at work on the G.W.R. system. The two Diesel railcars recently loaned to the L.N.E.R. are back at Worcester. A number of 2–6–0 mixed traffic locomotives lately numbered 83xx have reverted to their original 53xx numeration, as the extensions to the front buffer beam, fitted in order to provide greater weight and more stability at the front end, have been removed. The experimental 8-wheeled tender which has been running for some time attached to one of the "Castle" class express engines at present forms the tender of No. 5017, "*St. Donat's Castle*."

Some remarkable batches of light engines coupled have been seen proceeding north towards Banbury from London, probably in connection with heavy freight and special traffic. The following are examples: 4–6–0 No. 4000 "*North Star*," a "Castle," coupled to four American 2–8–0s; a "Saint" 4–6–0, a 28xx 2–8–0 and a 2–6–0, running quite fast and presenting an extraordinary picture, as the 4 ft. 7½ in. driving wheels of the 2–8–0 appeared to be flying round, this mineral engine being sandwiched between the express locomotive and the 5 ft. 8 in. 2–6–0; an "Earl" class 4–4–0 from the Cambrian line, very rare in London, attached to a U.S.A. 2–8–0; a five-engine batch consisting of two "Castles," a "Hall," a "Mogul" and another American that brought up the rear. Even that was not the limit, for a week or two later a "train" of six engines went northward quite a long way along the main line. It was a mixed bag too comprising a "Hall," a "Grange," a 47xx mixed traffic 2–8–0, a 28xx mineral, a 26xx inside cylinder "Aberdare" goods 2–6–0 and finally an 83xx mixed traffic 2–6–0.

Aerodrome Materials by L.M.S.R.

During last winter and spring, some 91 special trains were run every week as part of the huge war effort in the way of freight traffic, carrying 42,000 tons of tar macadam and cement for aerodrome runways. Most of this material was for the resurfacing or extension of runways to allow greater bomb loads to become airborne.

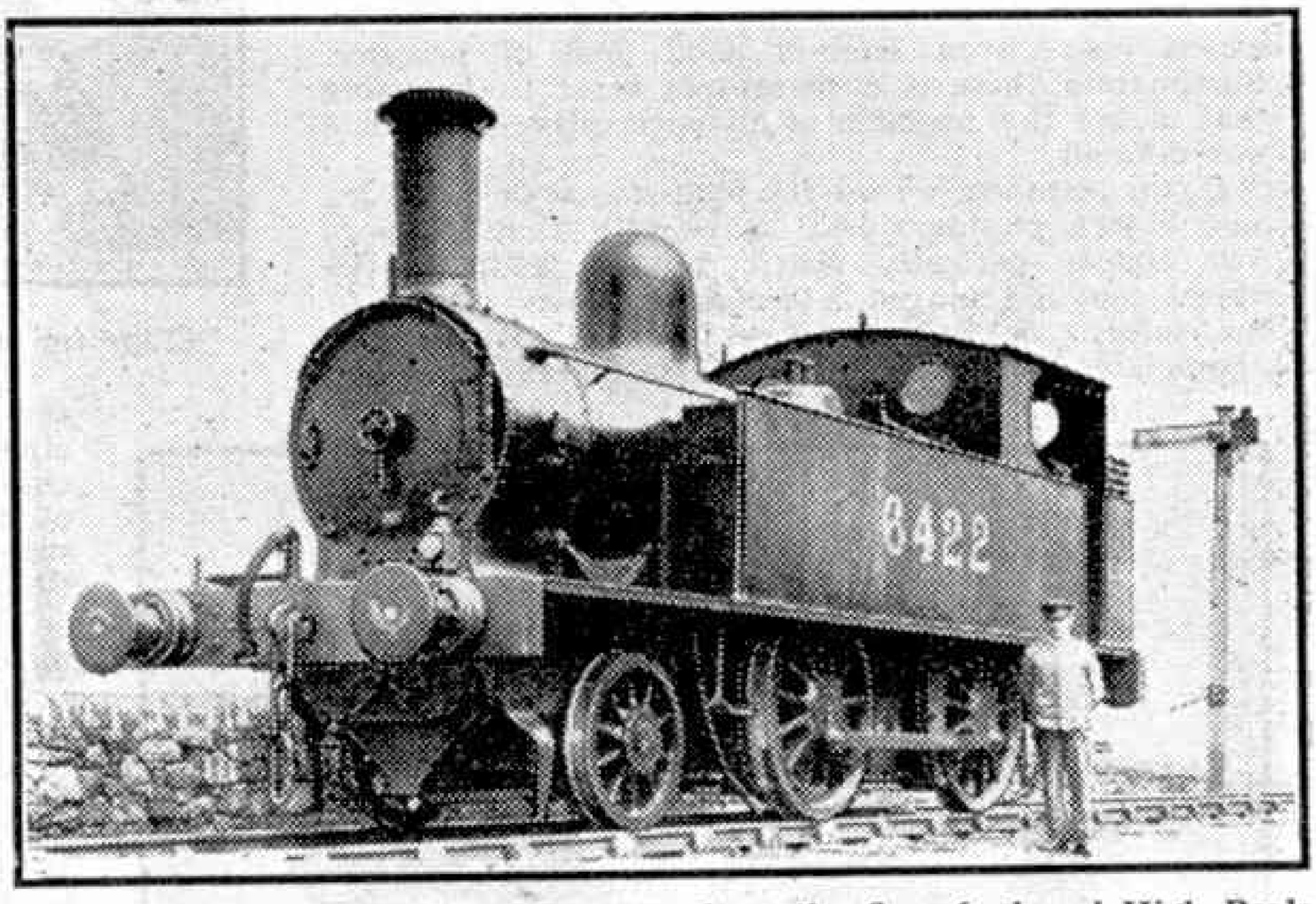
L.M.S. Locomotive Notes

The latest "Pacifics" of the "6230" series, not streamlined, now being turned out are Nos. 6250 "*City of Lichfield*," 6251 "*City of Nottingham*" and 6252. New class "5" 6 ft. 4–6–0s include Nos. 5497–9, and then a batch now in hand numbered 48xx, of which a good many are already running. The 55xx numbers are already allocated to 4–6–0 express locomotives. Further "Royal Scots" rebuilt, or in process of being so, include Nos. 6116 "*Irish Guardsman*," 6127 "*The Old Contemptible*," 6133 "*The Green Howards*" and 6138 "*The London Irish Rifleman*."

Among Scottish engines withdrawn are 4–6–0 No. 14766 "*Clan Chattan*," of the Highland Railway "Clan" class; inside cylinder class "4F" 2–6–0 goods No. 17822, one of the series built in 1915 for the former Glasgow and South Western Railway, of which four remained in service at the beginning of the present war; and "2P" 4–4–0 No. 14348, of the once famous ex-Caledonian Company's "Dunalastair III" class, dating from 1900.

We illustrate two of the interesting little tank engine types seen on the Cromford and High Peak branch in Derbyshire, an ancient line, chiefly used for mineral traffic, on which in places gradients are so steep that wagons are moved by rope haulage; where the locomotives do operate with limited loads there are other short climbs that rank among the most severe on any normally operated railway. There is now only one of the 2–4–0T type left on the branch and indeed on the whole of the L.M.S.; this is No. 6428, built in 1877 by the London and North Western Railway with driving wheels of the same diameter as the standard rail gauge, 4 ft. 8½ in. and cylinders 17 in. diameter with a 20 in. stroke. This veteran is now 67 years old.

The most powerful engines on this line are the small 0–6–0 freight tanks which hail from the one-time North London Railway, by which company,



One of the Crewe-built 2-4-0Ts as used on the Cromford and High Peak Railway. There is now only one left on the High Peak line, and on the L.M.S. Photograph by H. C. Casserley.

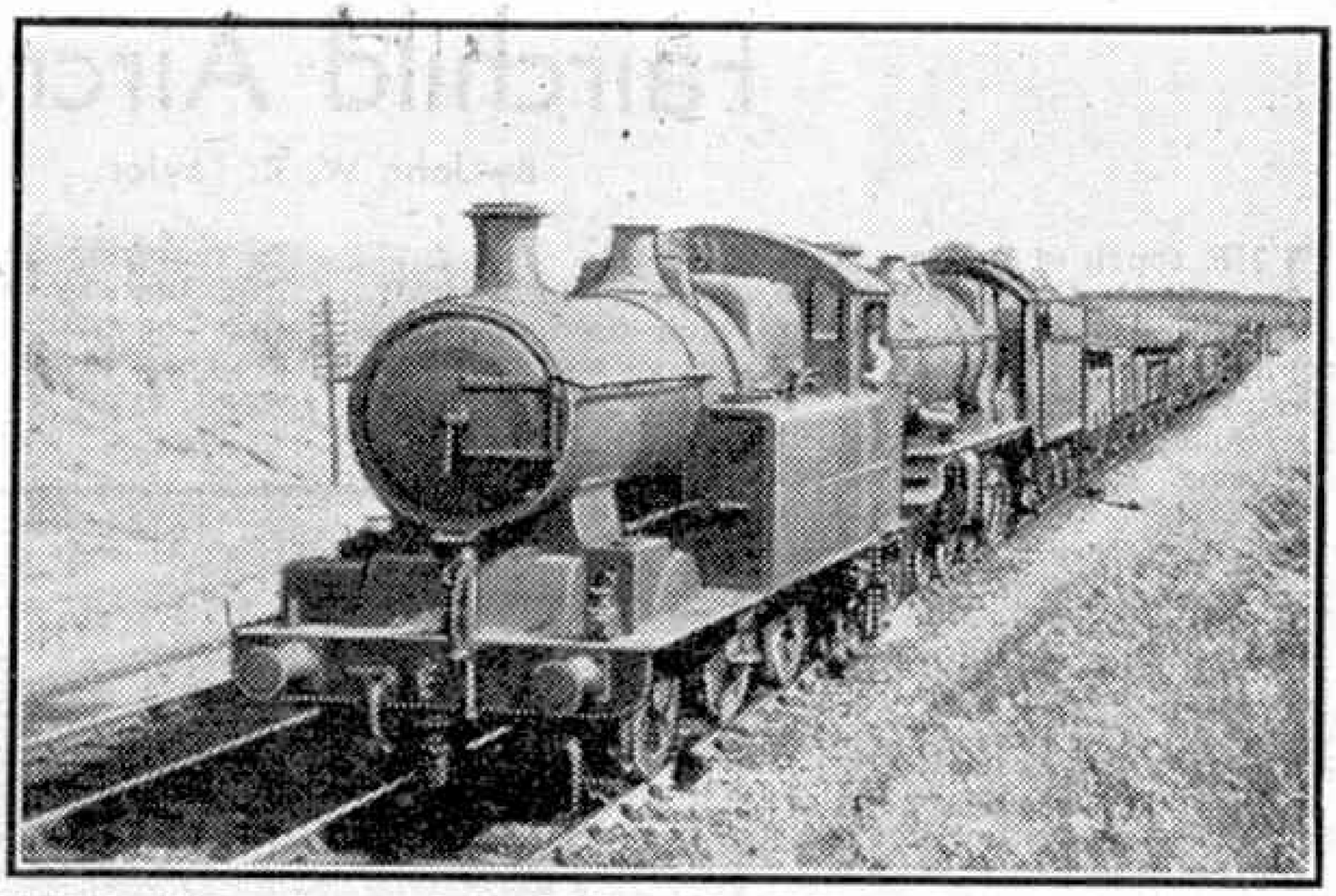
for example, No. 27505 was built at Bow, East London, in 1880 for local dock and freight work. It has horizontal outside cylinders, inside slide valves, 160 lb. per sq. in. boiler pressure, and 4 ft. 4 in. wheels. This particular locomotive began as No. 76. The number was altered to 116, and then in 1909, on the acquisition of the North London by the former London and North Western Railway, became 2650 in the latter company's books. In 1926 the L.M.S. gave her the number 7505, which in 1934 became 27505 on the non-standard list. Then there was recently a quaint but modern 0–4–0 saddle tank, No. 7000, class "0F," being one of five built by the L.M.S. for light shunting duty in 1932. The engines of this class have small outside cylinders and wheels only 3 ft. 10 in. diameter.

Reduced regular services with the running of many specials leave engine workings unbalanced. As a result several double-headed expresses have been reported between Euston and Crewe. Locomotive combinations including a "Pacific" and a 4–4–0 compound; two "Royal Scots," and a "Royal Scot" with a "Jubilee" 4–6–0. Loads are sometimes up to 17 bogies of modern type, while one of 18, plus a horse box, was recently noted hauled by a "Royal Scot" alone.

Thirteen Minutes Made up in Thirty-Five Miles

News of a remarkable time recovery effort is to hand from Pte. J. D. Haughton. After starting from

Liverpool, Lime Street, L.M.S. streamlined "Pacific" No. 6240 "*City of Coventry*" unfortunately slipped badly on the greasy rails at the first tunnel mouth and, on account of the wheels failing to grip, came to a stand on the sharply rising gradient shortly afterwards. The train was backed into the platform, the rails were sanded and a fresh start was made with more success. On passing Edge Hill Junction near the top of the incline the train was about 13 min. late, but the driver, determined to remove this deficit at the earliest possible moment, proceeded to give an outstanding demonstration of the great engine's power of acceleration with a comparatively light 8-coach load weighing some 260 tons gross. Although service slacks not far apart were observed scrupulously and there are some sharp rises, maximum speed rose into the "eighties" and 65-70 m.p.h. was sustained uphill in peacetime "Coronation Scot" style.



G.W.R. Gloucester goods hauled by "Castle" class 4-6-0 piloted by ex-Taff-Vale 0-6-2T No. 278. Photograph by G. O. P. Pearce.

On approaching Crewe all lost time had been recovered and although there was an actual stand outside for signals, this London-bound express ran into platform 4 punctually. The net time for the 35¾ miles over a far from easy road was only 35 min. and although the present allowance of 50 min. is liberal, it was an amazing achievement to make up so much time in so short a run.

Canadian Built Locomotives for India

Before the war Indian locomotives were built mainly in Great Britain, but pressure on works and shipping has made it impossible to supply Empire needs from here during the last few years. In order to meet an urgent demand for powerful freight engines in India, it has been found possible, notwithstanding Canada's huge engineering contribution to the Allied effort, to place orders for 145 2–8–2 tender locomotives with two Canadian firms, and the engines are now in course of erection and shipment. They are for the 5 ft. 6 in. gauge, so a special outer rail has had to be laid near each works in order to provide a test track. It is interesting to learn that the initial inspection as well as the re-erection of these engines in India is in the hands of the Canadian Pacific Railway, acting on behalf of the Government of India, and that for conveyance by sea each locomotive is dismantled and packed in 17 crates, requiring five large C.P.R. freight cars for the journey to the port.

The completed engines have two outside cylinders, 21 in. diam. with 28 in. stroke, driving wheels of 5 ft. diam., heating surface, including an ample grate and superheater area, of 2,787 sq. ft., and a tractive effort of 35,000 lb. An eight-wheeled tender of large capacity is provided in which 13 tons of coal can be accommodated as well as 4,500 gallons of water.

Three Engines and a Goods Train

The upper illustration on this page is unusual in more ways than one. The combination of locomotives heading it was exceptional, especially on the line on which it was taken; then, although scarcely visible, a small tank engine was being hauled "dead" among the wagons towards the rear. The 0–6–2T acting as pilot was one of the general service Taff Vale Railway "04" class, built in 1910 by the Vulcan Foundry Ltd., and rebuilt by the G.W.R. in 1929 as No. 278 on their list, with Swindon boiler and fittings.

Plastic Panelled Luggage Vans

It is unusual in Britain nowadays to see four-wheeled luggage and parcels vans running, especially attached to fast passenger trains, though this is a regular feature of the Southern Railway. They are long-wheelbased vehicles well suited to the traffic requirements of that system and have hitherto weighed 13 tons empty. The advances recently made in the manufacture of plastic materials have prompted the Southern authorities to build a new series of these "Utility Vans," the body panelling of which consists of plastic material reinforced by high tensile steel wire and cotton in conjunction with bakelite sheets weighing 11½ oz. per sq. ft. The external finish is black at present, the surface being impervious to acid and atmosphere.

Ex-North London 0-6-0 goods tank engine, now employed on the L.M.S. Western Division. Photograph by H. C. Casserley.

L.N.E.R. "Pacifics" in Manchester

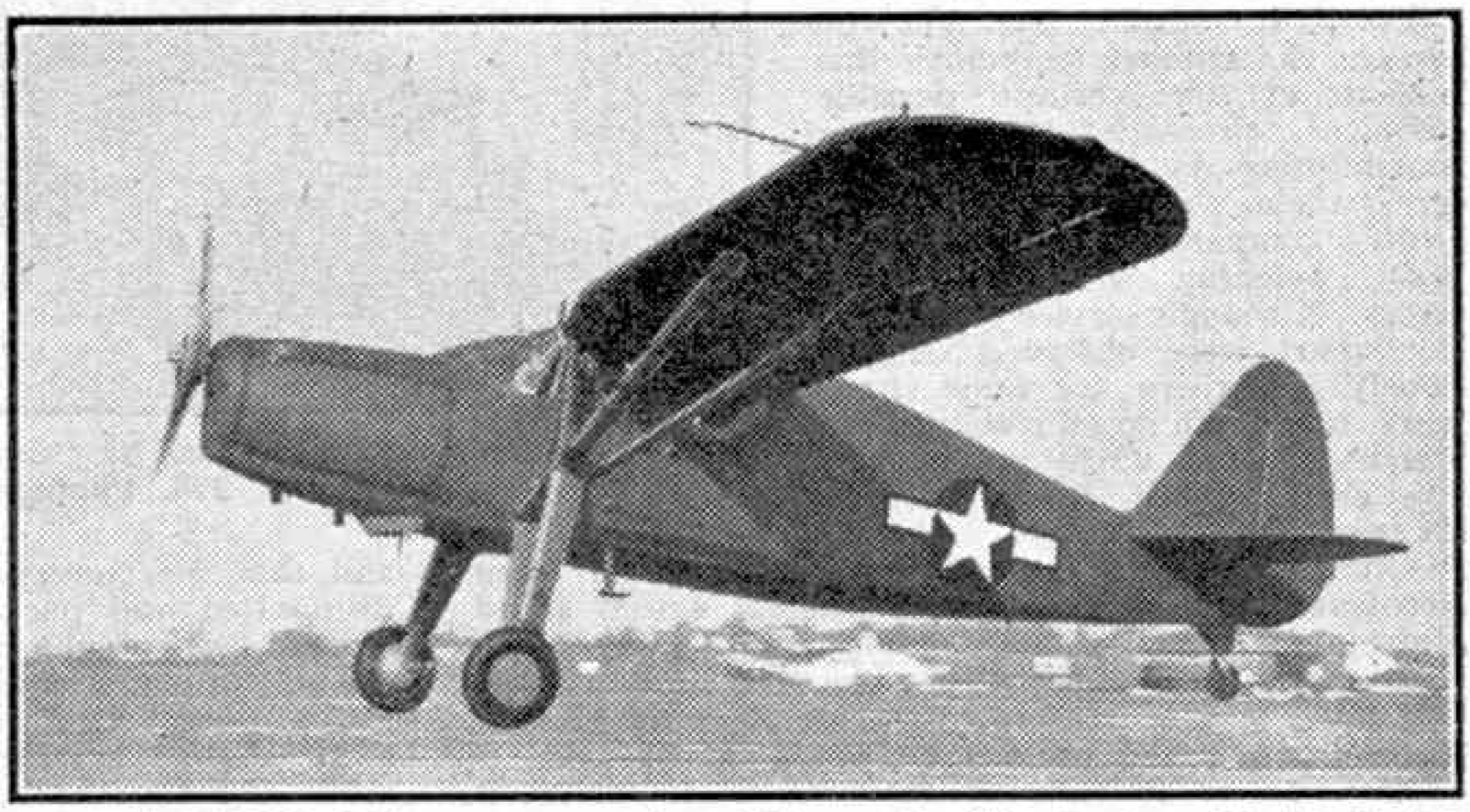
"Pacifics" have returned to the Great Central section of the L.N.E.R., working from Manchester to Marylebone and elsewhere. They are shedded at Gorton, Manchester, and are mostly of the "A1" series from the Great Northern section, including the pioneer No. 4470 "*Great Northern*" and No. 4472 "*Flying Scotsman.*"

Fairchild Aircraft

By John W. R. Taylor

"THE touch of to-morrow in the planes of to-day" —that's the proud motto of Fairchild Aircraft, a motto that is reflected in all their products. The company dates back to 1925, when two separate groups interested in aircraft construction, The Fairchild Airplane Manufacturing Corporation and The Kreider-Reisner Aircraft Company, began activities in America. From the very first these two companies were notable for their advanced theories. In 1926 the little "Midget" emerged from the Kreider-Reisner "factory" at Hagerstown, Maryland, to win the "*Scientific American*" Trophy Race at the amazing speed of 94.49 m.p.h. It was a very small and tricky low wing cantilever monoplane of exceptionally clean lines, with a wing span of only 20 ft., and capable of a speed of 115 m.p.h. on 29 h.p. Meanwhile Fairchilds had started to build the series of high wing monoplanes that they are still building to-day. Even in 1925 their designers believed that prospective aviators might lose some of their enthusiasm when seated out in the open in cold or wet weather, and consequently their first aeroplane was a cabin monoplane powered by a 90 h.p. Curtiss OX.5 engine.

In 1929 the two companies united to form the Fairchild Aviation Corporation with their headquarters at Hagerstown. At about this time they built their first military aircraft, a small biplane fitted with a 160 h.p. Wright J.6 engine and armed with two machine-guns and five 25 lb. bombs. Some of these machines were sold to the Chinese Government, who used them to good effect against offending bandits and guerillas. Then came the 1931 slump, when any unsuspecting person who even hinted that he might be requiring an aeroplane was practically torn limb from limb by over-eager salesmen. Fairchilds realised that the position was desperate, and set to work to design a low-priced, easily-built aircraft suitable for small flying clubs; that aircraft was the Fairchild



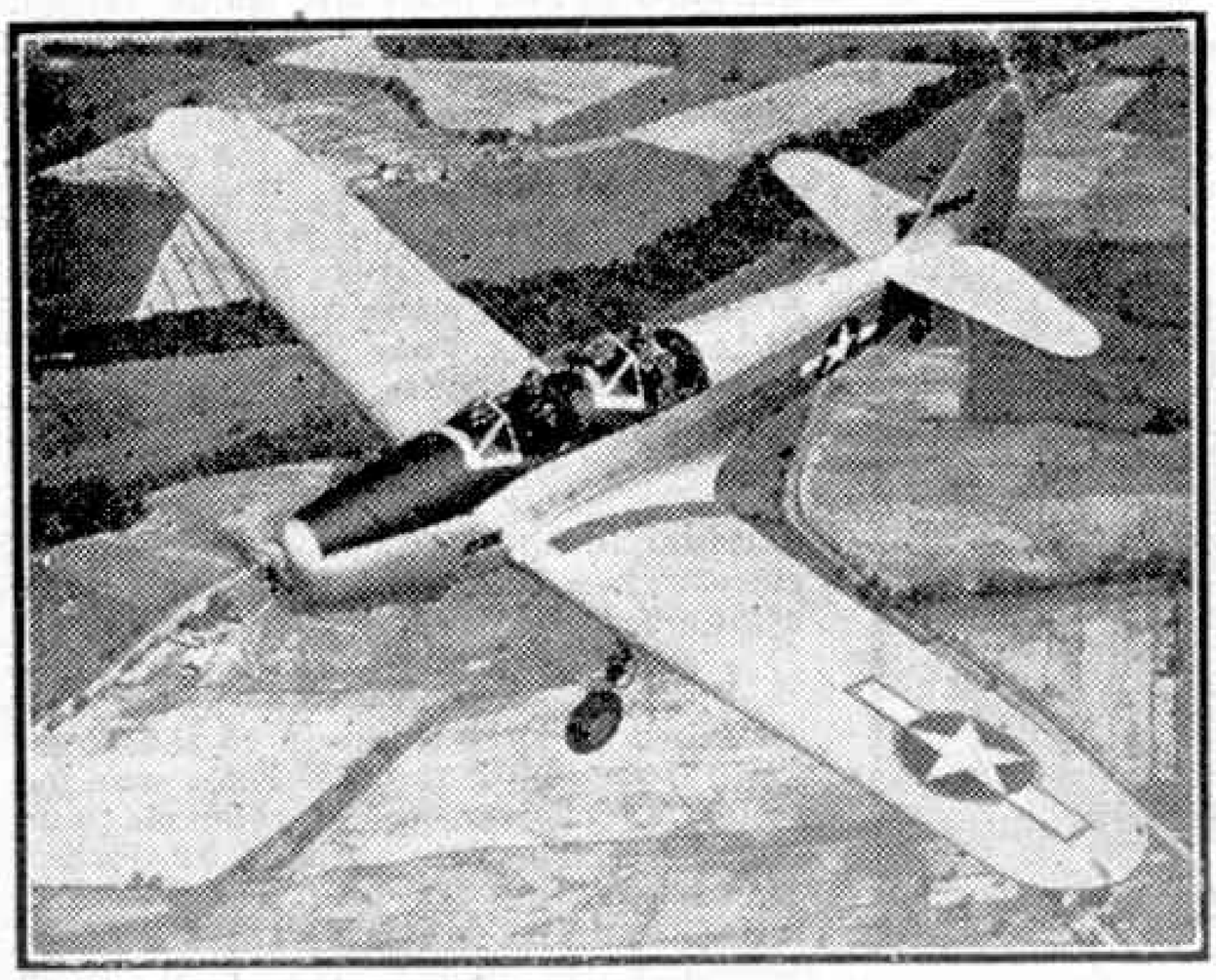
The Fairchild UC-61K cargo monoplane "Forwarder," in service with the R.A.F. as the "Argus." Photographs by courtesy of the Aircraft Division of the Fairchild Engine and Airplane Corporation, U.S.A.

22 high wing monoplane fitted with a 75 h.p. "Michigan Rover" engine. It was an immediate success, its price of £550 bringing it within the reach of many people for whom aviation had been too expensive before. It was in fact one of the first American light planes to go into production, and was years in advance of its time with a nicely-cowled in-line engine and a wide-track oleo-hydraulic undercarriage fitted with wheel brakes.

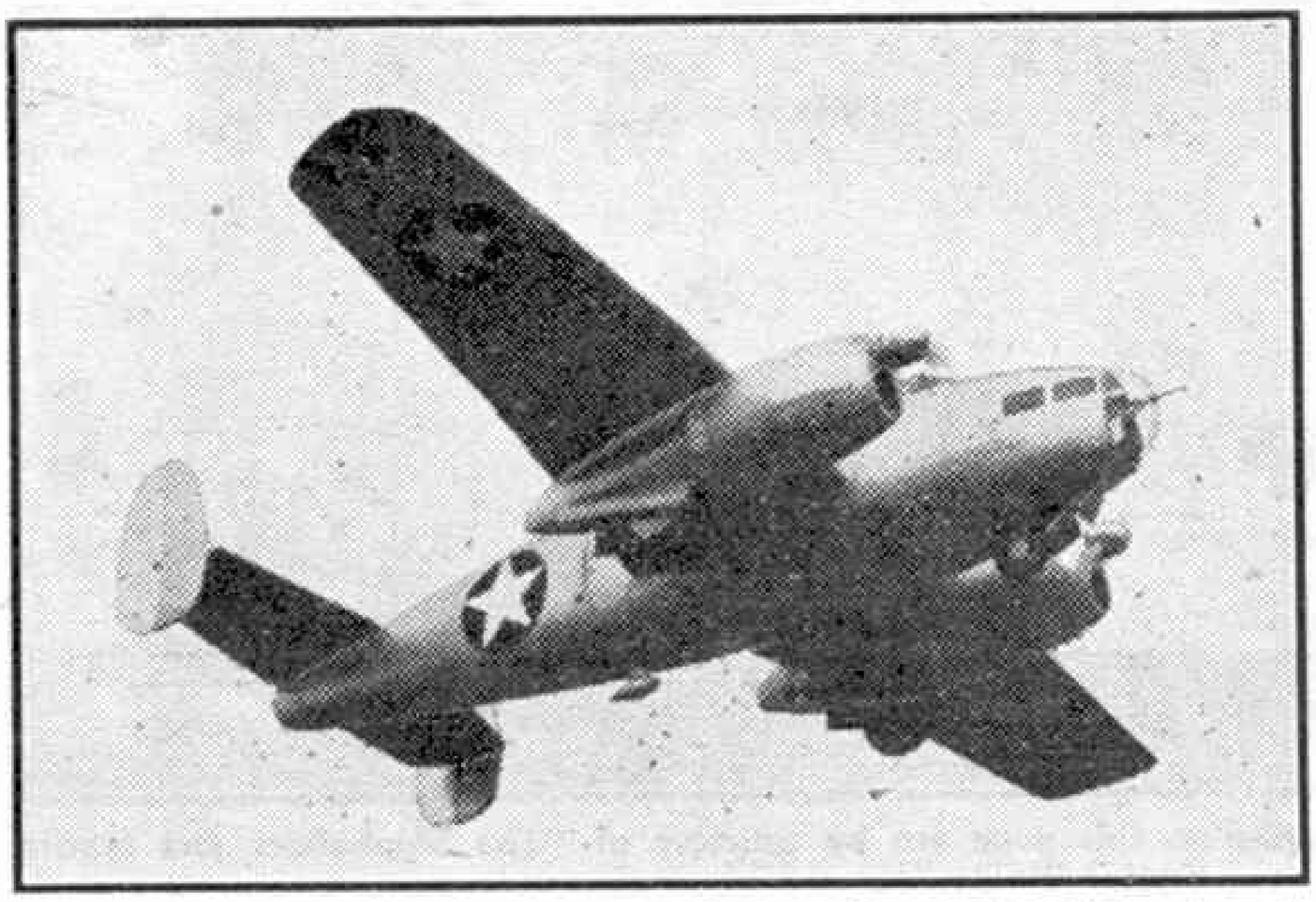
Two years later came the Fairchild 24, a type that has undergone continuous modification and refinement and is still in production as the "Argus" or "Forwarder." But not all Fairchild aeroplanes have been small high wing monoplanes. For instance in 1934, at the request of the United States Army, they built the C.31, a large transport powered by a single 750 h.p. Wright "Cyclone" engine. It was the first military transport ever designed for the U.S.A.A.F., and could carry a useful load of three tons at a top speed of 167 m.p.h., a good performance, even judged by present-day standards.

In 1936 the Model 91 "Baby Clipper" appeared on the scene. This was built for Pan American Airways, and was a 10-seater, all-metal, single-engined amphibian flying boat intended for use on the Amazon River. It caused many production headaches, but the first two delivered are still in service eight years later—a tribute to their sturdy construction. Incidentally, some Fairchild 91s have been used by the Royal Air Force for air-sea rescue duties during the last four years, and have stood up well to the rigours of operation in "murky" weather conditions.

One year later Fairchilds pioneered wood and plastic construction for aircraft when they built the "46," a very clean, all-wood, low wing cabin monoplane fitted with a 450 h.p. Ranger engine. Its moulded wooden fuselage was intended to speed up production and keep costs as low as possible, and proved



The PT-19 "Cornell" primary training monoplane.



Fairchild AT-21 "Gunner," designed for advanced training in air gunnery.

highly efficient. This "Duramold" process consists of binding together thin strips of veneer under heat and pressure, and combines great strength with lightness. The "46" was delightful to fly, very comfortable, and capable of a speed of well over 200 m.p.h. It is interesting to note that the phenomenally successful de Havilland "Mosquito" also utilises a moulded wooden fuselage—a feature that has enabled this machine to roll off the production line in ever-increasing numbers.

To-day Fairchild aircraft are in service all over the world. The best known model—the "Argus"—is doing front-line duty in Britain transporting pilots from operational areas to rest centres or aircraft factories, and enabling officers to travel quickly from one end of the country to the other, even when only small rough landing fields are available. At least one "Argus" has actually been used to carry urgently-needed blood plasma and ammunition up to the fighting line. It is a very comfortable four-seat, high wing cabin monoplane, the latest version being powered by a 200 h.p. 6-cylinder Ranger in-line engine. Its fuselage, tail unit and control surfaces are of metal construction, covered with fabric, while its fabric-covered wings are built up of two solid spruce spars, wooden ribs and a plywood leading edge. The "Argus," or "Forwarder" as it is known in America, has a wing span of 36 ft. 4 in., is 25 ft. 10¼ in. long and 7 ft. 7½ in. high. It has a wing area of 193.3 sq. ft. and, at an all-up weight of 2,882 lb., has a top speed of 124 m.p.h. and a range of 500 miles.

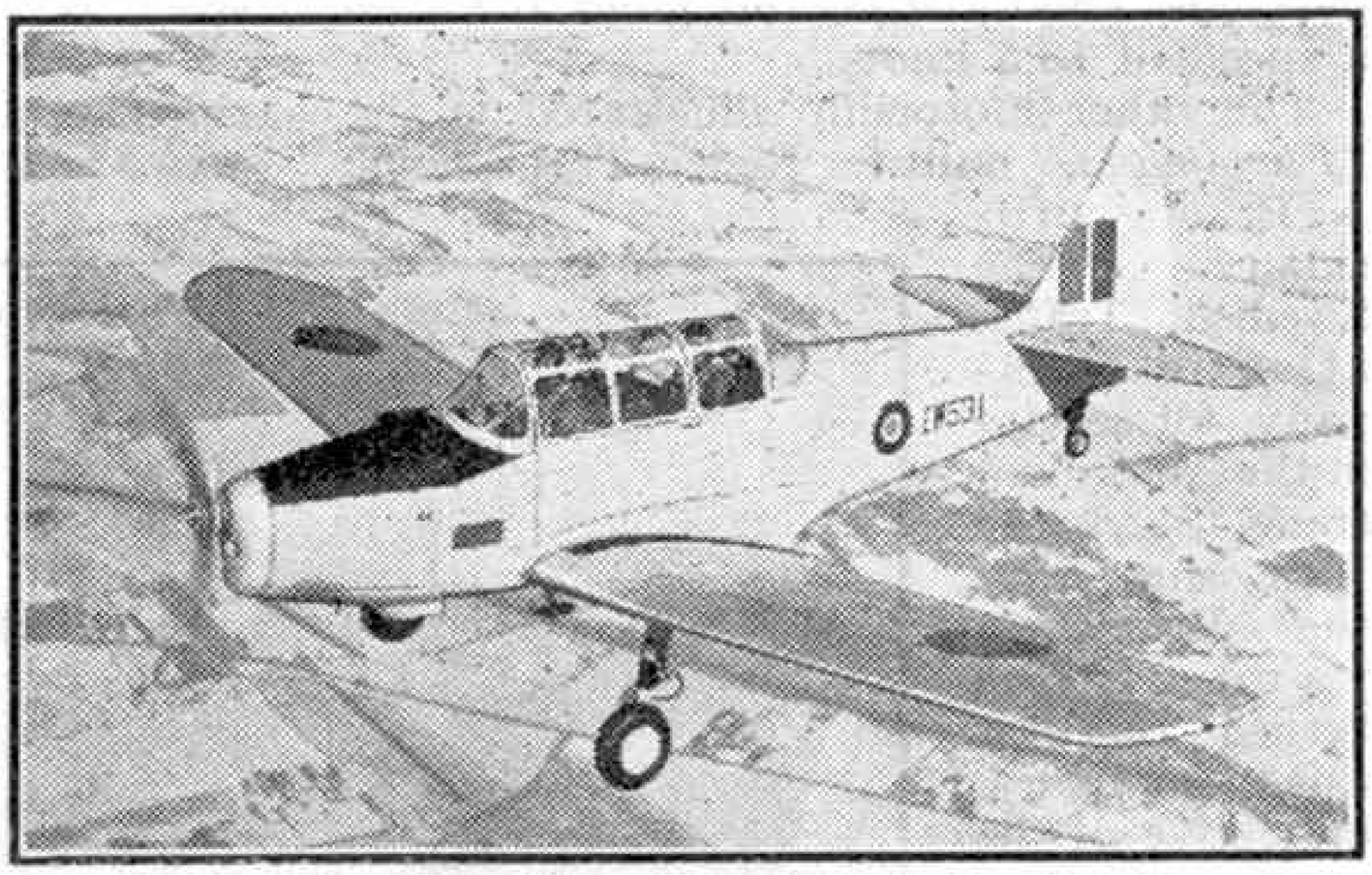
Then there is the AT-21 "Gunner," a first-class twin-engined trainer developed from the earlier AT-13 and AT-14 "Yankee-Doodle." It resembles the Lockheed "Hudson" in appearance, and is in large-scale production both at Hagerstown and by the Bellanca and McDonnell Aircraft Corporations. The "Gunner" carries a crew of five and is powered by two 520 h.p. 12-cylinder Ranger engines which give it a top speed of 230 m.p.h. at 12,000 ft. It provides training for all the members of the crew of a medium bomber, and carries ten 100-lb. practice bombs in its fuselage, which can be released by either the bomb-aimer or, in an emergency, by the pilot. A standard two-gun dorsal turret is provided for gunnery training, in addition to a movable nose-gun. Full operational equipment is carried, including oxygen and radio installations, and a vertical camera can be fitted to record the results of bombing practices.

The span of the "Gunner" is 52 ft. 8 in., and it is 37 ft. long and 13 ft. 1⅝ in. high. It has a wing area of 378 sq. ft., a loaded weight of 11,289 lb. and a normal range of 880 miles. Wooden construction is employed throughout to release vital metals for combat plane production, and the monocoque fuselage and boxwood-spar wings are both covered with "Duramold" skin. It has twin fins and rudders, all the control surfaces being fabric-covered over aluminium alloy frames. A tricycle undercarriage is fitted, all three wheels retracting backward, the main wheels into the underslung engine nacelles.

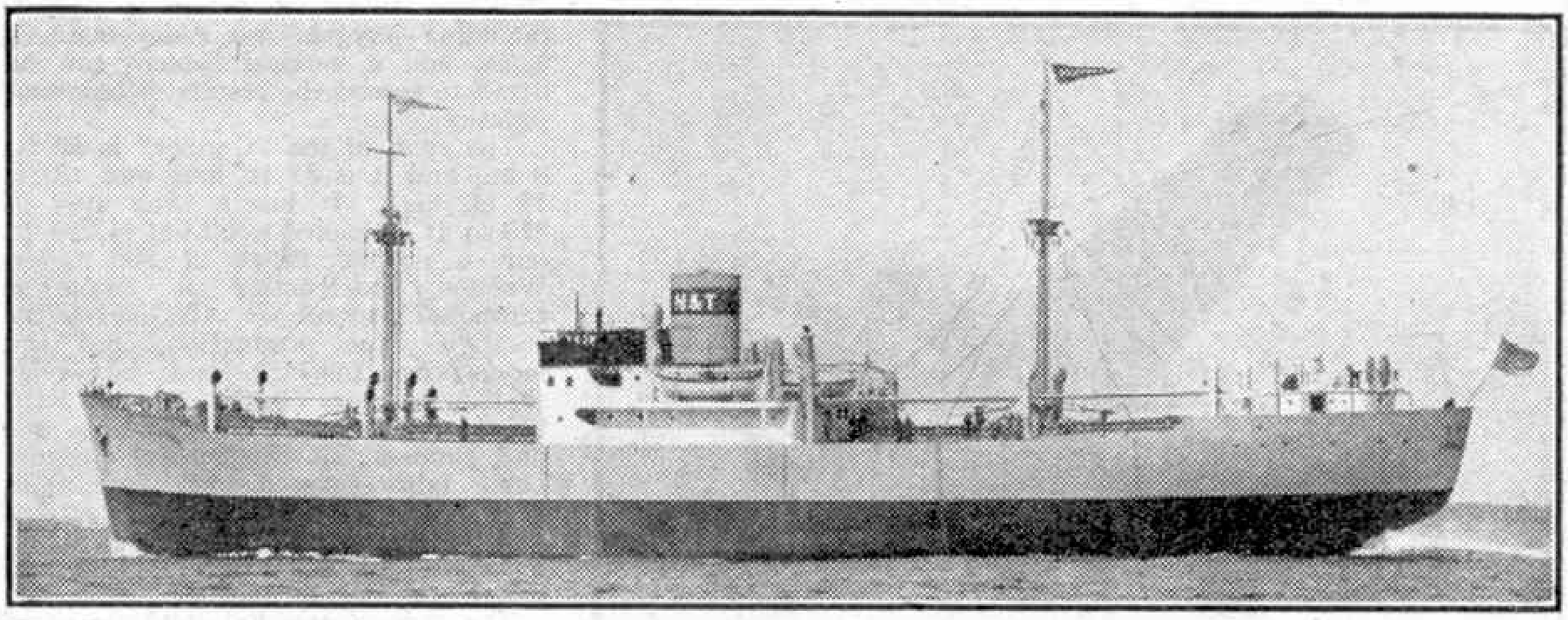
The last of the Fairchild types at present in wide use is the PT-19 "Cornell" two-seat trainer. This little low wing monoplane is probably the finest primary trainer in the world at the present time, and is in use with the U.S.A.A.F., R.A.F., R.C.A.F., and the Air Forces of no less than seven other United Nations. Although no longer in production, more than 7,500 "Cornells" were built between February 1940 and May 1944, 5,000 of these coming from the parent factory at Hagerstown. The original PT-19 was manufactured by the Fairchild, Aeronca and St. Louis Aircraft Corporations and is fitted with a 175 h.p. 6-cylinder Ranger engine. The PT-23, which was built by the Howard Aircraft Corporation and Fleet Aircraft Ltd., in Canada, as well as by the three companies already mentioned, is identical in construction with the PT-19, but has a 220 h.p. Continental radial engine. The Fleet-built PT-26 is also identical with the PT-19 in most respects but has a sliding transparent cockpit cover, cabin heater and additional electrical and training equipment. Incidentally the Ranger engines are also a product of the Fairchild Corporation.

The "Cornell" has a welded steel tube fuselage, fabric covered except for the top fuselage aft of the cockpits, which has a "Duramold" skin. The wings and tail unit have spruce spars and ribs with formed plywood skins, and the control surfaces are fabric-covered over aluminium frames. A standard fixed oleo-spring undercarriage is employed. The PT-26 has a wing span

(*Continued on page 358*)



The PT-26 version of the "Cornell," which the Canadian Government adopted as the standard primary trainer in the Commonwealth Joint Air Training Plan.



The Cargo Motorship "Trivia." Photographs on this page are by courtesy of "The Shipbuilder and Marine Engine-Builder."

Sea and Shipping Notes

New Swedish Motorships

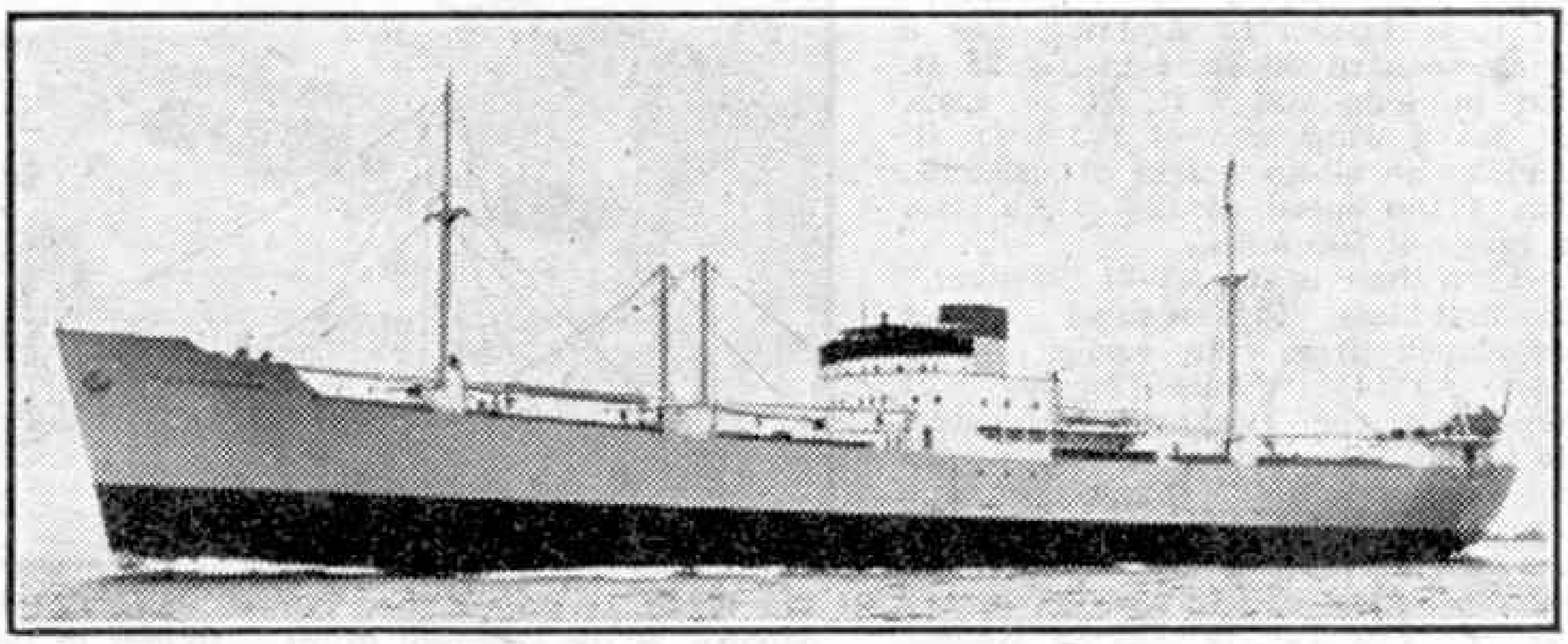
Two motorships recently completed by the Swedish shipbuilding firm Eriksbergs Mekaniska Verkstads A/B, of Gothenburg, are illustrated on this page. The upper one is the single-screw "*Trivia*," delivered in May last to Messrs. Nordström and Thulin, of Stockholm. It is of 5,000 tons deadweight, and has been built to the highest class of Lloyd's Register of Shipping. The Eriksberg—B. and W. Diesel propelling engine in this ship is of the single-acting, 2-stroke, 9-cylinder type, develops 3,500 I.H.P. and gives the ship a speed of 13.5 knots.

The other motorship illustrated is the "*Parramatta*," built for Rederi Transpacific A/B, a subsidiary of the Swedish Transatlantic Company, for service in the Australian trade. She is the 10th ship that the Eriksbergs yard have turned out for this company, indicative of the success of these vessels in service, and a further five are on order. The "*Parramatta*" is a single-screw ship to carry both cargo and passengers, of 9,120 tons deadweight and of shelter deck design. She is equipped with an Eriksberg single-acting, 2-stroke cycle directly-reversible Diesel engine developing 5,400 I.H.P., at which output the ship attains 14 knots.

* * * *

Eriksbergs Company have also completed recently an ice-breaking tug named "*Herbert*" for the Röda Bolaget Salvage Company, of Gothenburg. One of her many tasks will be ice-breaking operations on the Vanern, a large basin waterway. The "*Herbert*" is 90 ft. long, and her breadth moulded is 29 ft. 3 in., and depth moulded 14 ft. 9 in. She has a 1,000 h.p. triple-expansion steam engine and her speed is 11.5 knots.

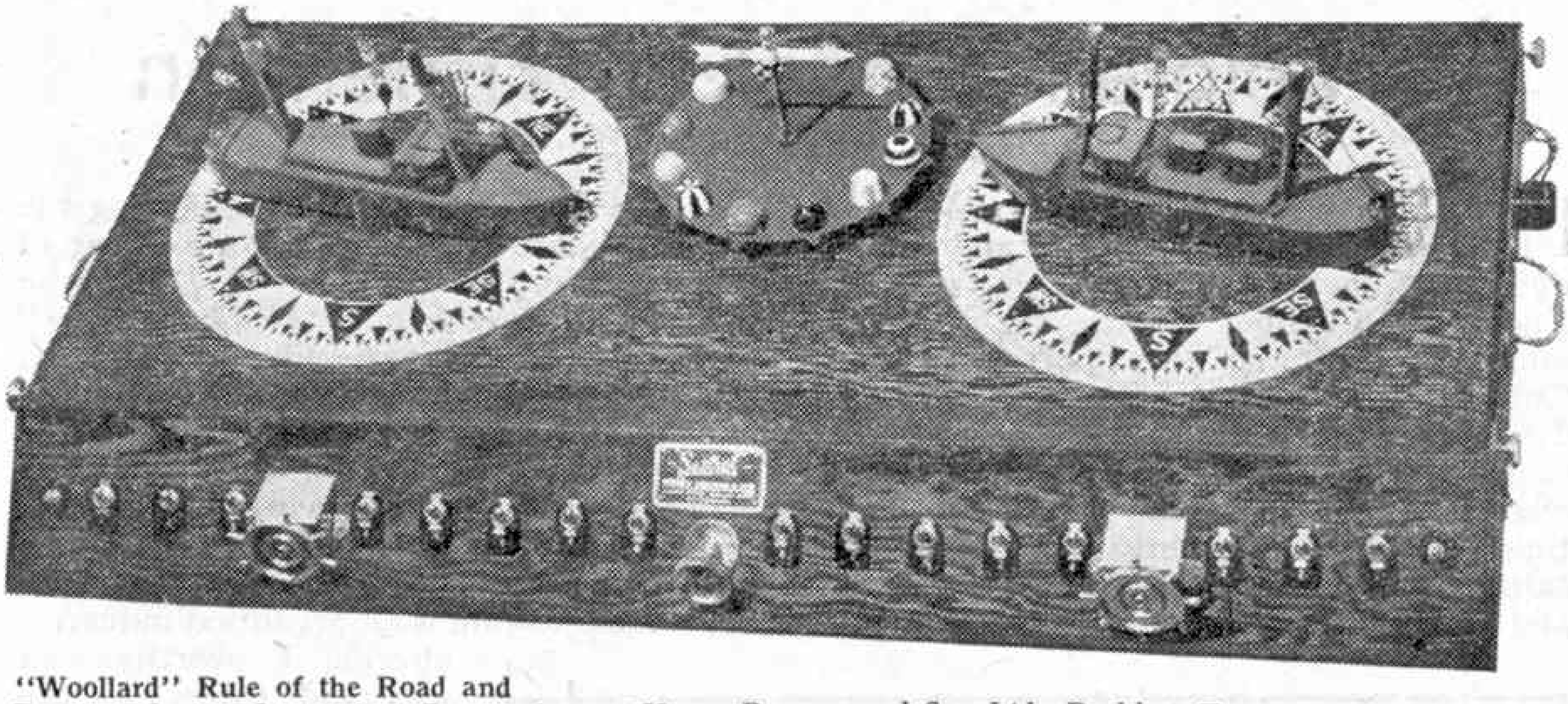
For our information regarding these ships we are indebted to "*The Shipbuilder and Marine Engine-Builder*."



The Cargo and Passenger Motorship "Parramatta."

* * * *

The Swedish aircraft-carrying cruiser "*Gotland*" has been converted into an anti-aircraft cruiser, the catapult equipment being replaced by anti-aircraft weapons.



"Woollard" Rule of the Road and Buoyage System Instructor. By courtesy of Henry Browne and Son Ltd., Barking, Essex.

The Rule of the Road at Sea

Learning the Rule of the Road at sea is one of the most important tasks for those who aspire to become navigating officers. It is an intricate subject and much attention has been given to improving the methods of teaching it. A remarkably ingenious apparatus for this purpose has been devised by Commander C. L. A. Woollard, R.N. (Retd.). This is known as the "Woollard" Rule of the Road and Buoyage System Instructor, and is manufactured by Henry Browne and Son Ltd., Barking, Essex.

The apparatus is shown in the accompanying illustration. It consists of a rectangular wooden case with a hinged base. Mounted on the case are two model ships, carrying the usual navigation lights and rotating above a compass card. The movements of the ships are controlled by two miniature brass steering wheels mounted on the front panel of the case. Between the ships is a turntable, operated by a knob at the centre of the front panel, and carrying 12 miniature navigation buoys. Over the turntable is also a wind arrow to denote direction of wind when the models are being considered as sailing vessels, and also to be used for indicating bearing or direction of currents.

By means of the 16 switches on the front panels, some 20 different combinations of lights can be switched on. An interesting feature is that all the lights are correctly screened and can only be seen on their prescribed bearings. By means of terminals fitted to the base, Morse keys can be connected so that the ships can be made to communicate with one another by either flashing or sound signals. Sirens have been incorporated in the apparatus, and these are tuned to imitate as closely as possible an actual ship's fog horn.

Recently the apparatus was put to a practical test. Of 30 recruits who joined a Sea Cadet Unit, 15 were taught the rule of the road by the old lecture method, the period of instruction lasting about one hour. They were then examined and the marks averaged 40 per cent. The other 15 cadets were instructed for a similar period on Commander Woollard's method, and when tested they reached a 93 per cent. result. The latter figure is made even more impressive by the certainty that the details of the instruction given by means of the model would be more firmly fixed in the memory of the trainees.

In addition to its value for instructional purposes, the apparatus will be very useful to nautical assessors and others for reconstructing cases of collision at sea.

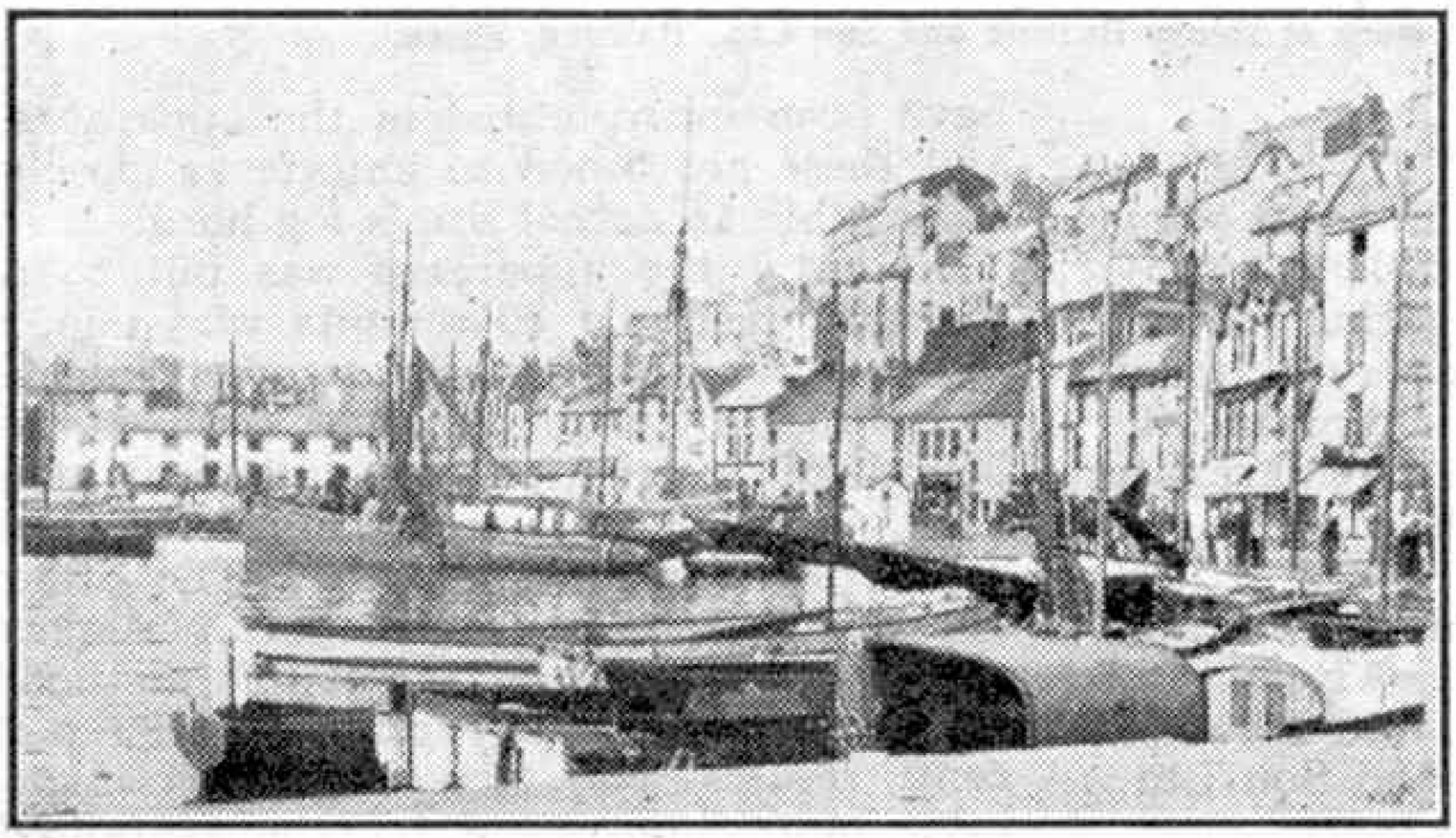
A Canadian Car Ferry

The Canadian Government have ordered through Canadian National Railways a new Diesel-engined ice-breaking car ferry for service between Cape Tormentine, New Brunswick, and Port Borden, Prince Edward Island. It will carry railway passenger and freight cars, buses, motor cars, and passengers. There will be five decks and room for 60 road vehicles and 18 freight cars. A feature of the passenger accommodation will be a restaurant large enough for 200 meals an hour to be served. The new ferry will be 372 ft. 6 in. long, 61 ft. in breadth and 24 ft. 9 in. in depth, and its eight Diesel engines will develop a total of over 12,000 b.h.p. It will be one of the most powerful vessels of its kind in the world.

A Belgian School for Fishermen

By Arthur Lamsley

IN May 1940, by a pre-arranged plan, Belgian fishermen "invaded" and subsequently "annexed" a small fishing port on England's Channel coast; the English inhabitants of the tiny port say they "adopted" the Belgians for the duration. The Belgian fisher folk came, anyway, in scores of craft and brought their wives and families with them. It took a little time to settle the "invaders" and find suitable accommodation for the women and children, but the Belgians, with sturdy independence and a superabundance of self-help, turning every obstacle into an opportunity, soon formed themselves into a self-contained and friendly colony on British soil. Indeed, walking through the main and bye streets of this small port to-day is a revelation in international friendship. English and Belgian fishermen's families are intimate neighbours in a prosperous communal life born out of war's tragedy.



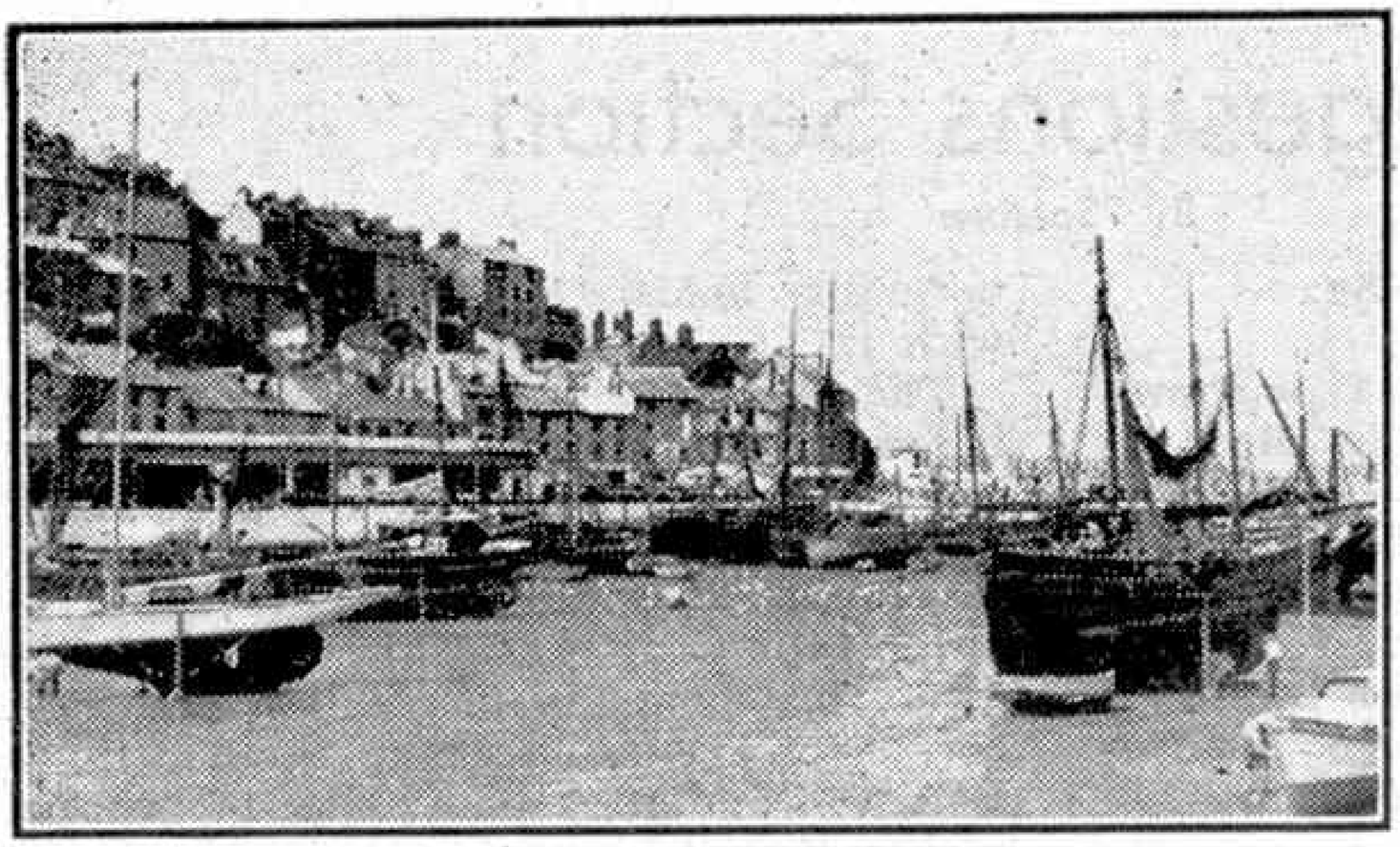
The inner harbour and fish quay of the port where the Belgian school for fishermen has been established in this country. The School is in one of the houses opposite the fish market.

This is the second time folk of the Low Countries have "invaded" this port. William of Orange landed here in the autumn of 1688, and was created King in the early days of the following year. A striking monument on the quayside, only a stone's throw from the Belgian Fishermen's School, marks the spot where he landed. Of interest to-day, too, is the fact that Napoleon spent his last hours here before being shipped in a British warship and exiled to St. Helena. But the local fishermen don't bother much with what they call "ancient history," preferring the more intimate and human story of one of their number, the Rev. H. F. Lyte, who wrote the lovely hymn *"Abide With Me"* in his tiny cottage overlooking the harbour. This hymn has been translated into every known language. It is always sung at the frequent services held in the Belgian Fisherman School, and the boys sing it in English.

Tradition has it that Belgian fishermen are among the finest in the Old World. With them fishing is an organised industry, offering á worthy and well-paid career to the sons of fishermen. In Ostend, head port of the Belgian peacetime fisheries, there was a School for Fishermen, where boys from 13 to 15 years of age were taught to fish scientifically, and at 16 were required to pass a fairly exhaustive examination before being allowed to become members of the crews of fishing craft. When the Belgian fishermen were forced suddenly to leave their land and "invade" England they had no time to collect their School, which lost all its valuable instruments, charts, and general teaching apparatus to the enemy. But the School staff managed to escape, and the next thing was to try and recreate the Belgian School for Fishermen on British soil, especially as many families that had escaped from the Germans included a good number of young lads all desiring to follow in their fathers' footsteps.

The Belgian Government in London gave its practical blessing to the desire for re-establishing the School, and with the aid of Minister Gutt and M. Lemure, the Director of Belgian Marine, M'O. de Deken, the Principal, assisted by a staff of six professors and instructors, was given facilities to rebuild the work of the School. Premises were found on two top floors of an old storehouse facing the fish market, and the staff went to work to re-equip the School.

While the Admiralty and the Board of Trade helped with some equipment, most



Low tide at the Belgian fishermen's English home.

of it was improvised by the Principal and his staff, working night and day for weeks creating instruments, charts, nets and scientific apparatus, and even making the benches and desks at which the new generation would have to work. Local folk also lent a hand, supplying wood, bits of metal, parts of old nautical instruments, rope, old nets, indeed anything to help their "invaders" to start up again.

Principal De Deken tells me the aim of the School is twofold—the education of boys from the age of 13 to become efficient members of the crews of fishing vessels, and special training for the more ambitious boys who wish to take the official examination for mate or extra-master in the fishing ships, or as an engineer for motor machinery up to 500 h.p.

There are five departments of study. These are navigation, including seamanship, meteorology, nautical instruments, maritime law and signalling and rules of sea road, and students pass tests in the use of sextants, chronometer, compasses, mirrors and sounding devices, and in chart reading. The general branches include mathematics, Flemish, English, French, geography, history and hygiene, which includes first aid at sea. Engineering includes the construction, parts, and working of any type of marine motor up to 500 h.p., knots, splices and rigging, net making and repairing. In all five sections discussion is bi-lingual, in Flemish and English.

Each scholar is presented with a set of 11 books, all of which have had to be re-written by Professor De Deken, Principal, and Professor M'Vanhove. The book on engineering has been written by Inspector of the Belgian Navy Chief Engineer M'L. Local. At night the School is open to adult members of the fishing industry who wish for additional study, enabling them to take certificates as mates, masters or chief engineers. The examination for master is equivalent to that of the British Board of Trade.

Many of the Belgian boys who came over with their parents were only 12 years of age and knew nothing of fishing, excepting what they had experienced on occasional trips with their father. It was decided to try and find them work in other spheres. So two friends, Adriaan and Hendrik, were sent up to London to learn a trade. Neither liked city life and longed for the sea, and they spent all their leisure hours around the docks. Finally, they decided to play truant after six months in London and to make their way to the port where they knew their parents were living. Both boys, sturdy youngsters, after an adventurous journey over 200 miles managed to find the fishing port. Each got a good hiding from his parents, who insisted on their going back, but the boys insisted that they had no interest in city life and wanted only to be fishermen. They were taken in at the School and to-day are two of the finest pupils, almost ready to pass out into the trawlers for their sea-going apprenticeship.

A fascinating department contains models of every type of buoy in the world.

Belgian fishermen are winning a rich harvest from the sea to help in stocking the wartime larder.

Suggestions Section

By "Spanner"

(659) Planetary Gear-Box

("Spanner")

A planetary gear-box of the type shown in Fig. 659 is unique so far as Meccano construction is concerned. In actual practice planetary or epicyclic gears are used to a large extent, but in almost every case an internal-toothed wheel or drum is employed to actuate the planet wheels or idler pinions. The Meccano gear-box shown in Fig. 659 provides two speeds forward, reverse and neutral gears.

The drive is taken from Rod 1 and the motion is transmitted through the gear-box to the driven Rod 2. A ½" Pinion on the driving Rod engages with the 3½" Gear Wheel 3, which is free to rotate independently about the Rod 2. The 2½" Rod 4 is journalled in one of the holes in the face of the Gear Wheel 3 and carries a ¾" Pinion 5, a 1" Gear Wheel 6 and a ½" Pinion 7, all fixed to the Rod. Its other end is supported in a 2½" Strip 8 that is free to turn on the Rod 9.

The ¾" Pinion 10 is immovable, being gripped by its set-screw to a 2" Threaded Rod secured to the Gear Wheel 3 in the hole opposite to that carrying Rod 4. Two nuts, one placed behind the 3½" Gear Wheel 3 and the other on the Threaded Rod immediately against the boss of the Pinion 10, are screwed up very tightly to secure the Pinion and the Threaded Rod rigidly to the Wheel 3. Two Washers are placed between the Pinion and the 3½" Gear Wheel.

The other end of the Threaded Rod enters a Threaded Boss 11 secured to the Strip 8 by a ⅜" Bolt. The Coupling 12 is added to assist in balancing the weight of the Rod 4 and its components. The 50-teeth Gear Wheel 13, which forms the sun wheel, is secured to the driven Rod 2, and a Compression Spring is placed between it and the Wheel 3. The Spring normally holds the Wheel 13 in gear with the ¾" Pinion 5.

The Rod 9 is slidable in its bearings but is prevented from rotating. It carries a 1" Gear Wheel 14 and a 57-teeth Gear Wheel 15, both secured in position by their set-screws. The Rod protrudes about ⅛" beyond the Gear Wheel 14. The operating lever 16, which pivots about a point 17, carries a Double Bracket fitted with a Bolt that enters a Coupling 18 secured to the Rod 9.

The mechanism is shown in reverse

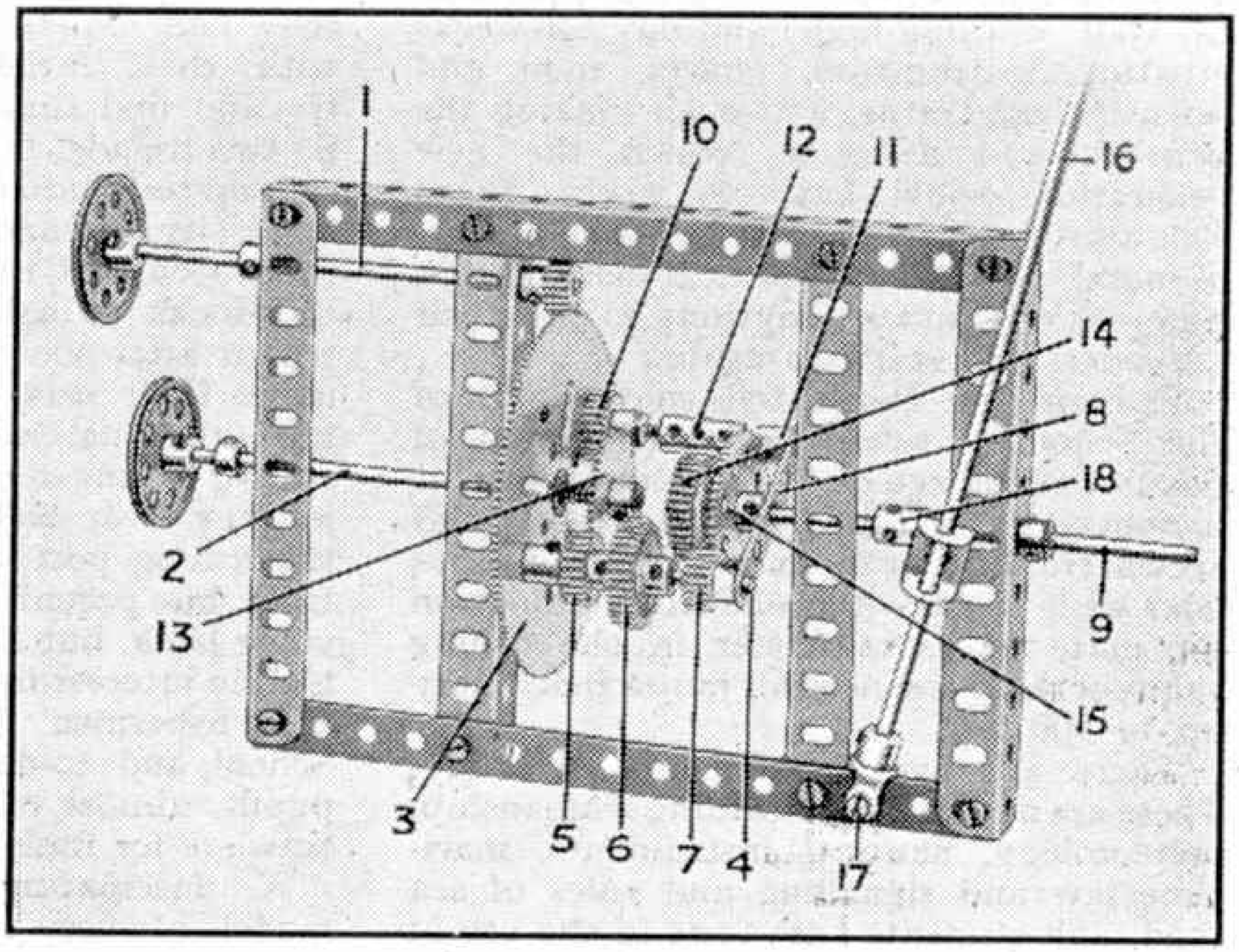


Fig. 659.

gear with Gear Wheel 15 engaging Pinion 7. In this position Rod 2 rotates in the same direction as the driving Rod. "Neutral" is obtained by pushing the lever 16 forward so that the Gear Wheel 15 is disengaged from the Pinion 7. Additional movement of the lever brings Gear 14 into engagement with the corresponding Gear 6, thereby causing Rod 2 to turn slowly in an opposite direction to the driving Rod and give a slow forward speed.

Further movement of the lever presses the protruding end of Rod 9 against the end of Rod 2 and throws the Wheel 13 out of gear with the Pinion 5 and into engagement with Pinion 10, thus producing in effect, a straight-through drive. Rod 2 now rotates at maximum speed.

(660) Electric Gas Lighter
(N. C. Ta'Bois, Woodford Green)

Fig. 660 shows a novel and useful gas lighter designed by N. C. Ta'Bois, and which can be built up from Meccano parts. A gas lighter element, which can be purchased from most electrical apparatus suppliers, is connected to the main apparatus by a length of flex. When the handle carrying the element is lifted from its rest a battery is switched into the circuit, causing the element wire to glow. On replacing the lighter in its rest the current is switched off and the glow extinguished. In the illustration a dry accumulator is shown, but this may be replaced by a dry cell if desired.

A 5" Rod 1 carries at each end a Collar and to the lower one is attached a Double Bent Strip by which the apparatus can be fixed to a wall. The lower Collar also supports a 1" × ½" Angle Bracket 2 to which is secured a ⅜" Bolt. This has a Compression Spring on its shank acting on a Swivel Bearing carrying a 2½" Rod 3. A $\frac{7}{32}$" Grub Screw in the Swivel bearing keeps the Spring in place. Two Pawls 4 without bosses are attached to a "spider" by Bolts and Washers, and form a rest for the lighter.

A Double Bracket is fixed to the Swivel Bearing as shown and carries an insulated ⅜" 6 B.A. Bolt. Above this is a Handrail Support fixed to the 5" Rod by a Collar. It carries a ½" 6 B.A. Bolt, which is insulated by means of two Insulated Bushes. The battery 5 is gripped between this Bolt and a 1" Screwed Rod 6

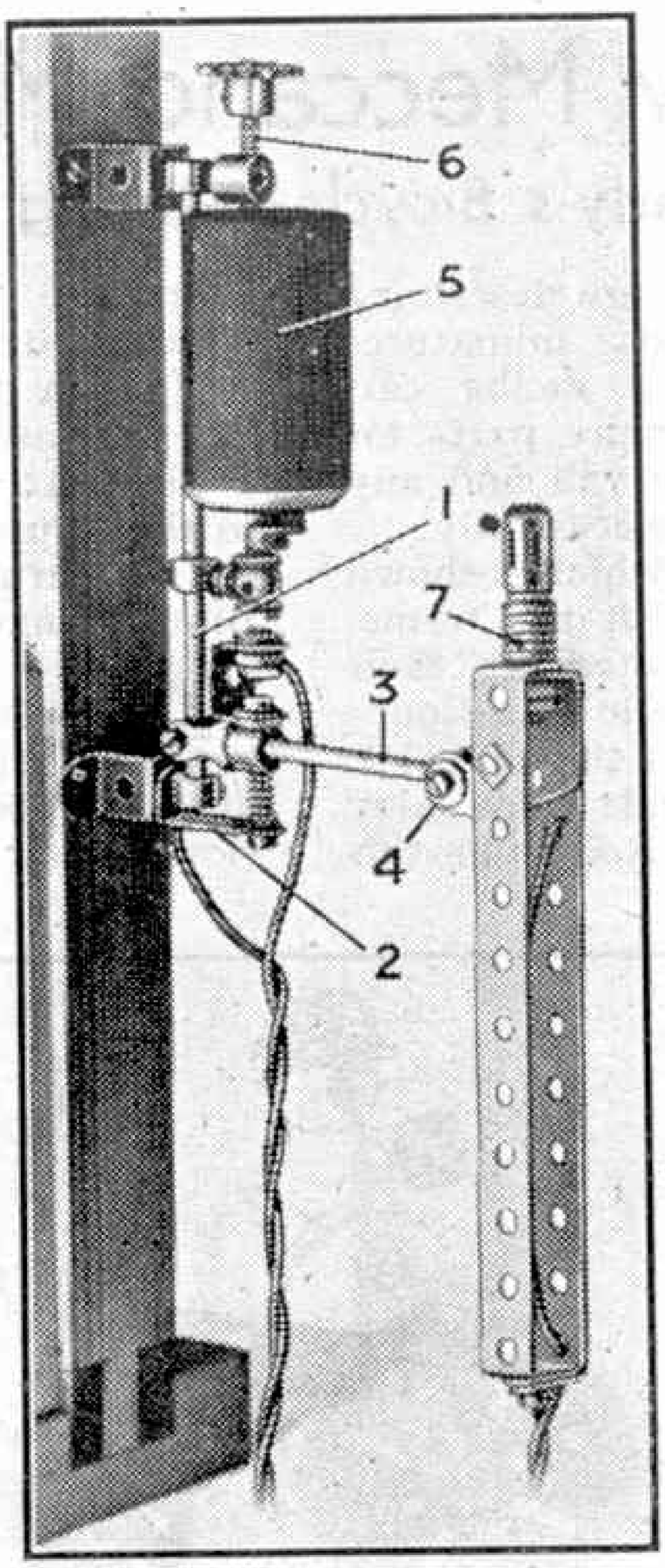


Fig. 660.

in a Rod Socket, the latter being attached to the uppermost Collar on the 5" Rod. A ¾" Sprocket Wheel facilitates rotation of the Screwed Rod.

The handle consists of two 5½" × ½" Double Angle Strips. A 1" Screwed Rod in the next to top holes of these hangs on the Pawls without bosses. A Lamp Holder 7 is attached by a 6 B.A. Bolt and Insulating Bush to the upper ends of the Double Angle Strips, and a length of twin flex connects the lighter element with the battery and switch arrangement. One wire unites the insulated Bolt on the Double Bracket with the insulated Bolt securing the Lamp Holder. The other wire is taken from the Bolt holding the lower Double Bent Strip to the Bolt joining the lower ends of the 5½" × ½" Double Angle Strips. The flex should be long enough to reach the burners in the oven if the lighter is to be fixed by the gas stove.

(661) A Useful Roller Bearing
("Spanner")

Fig. 661 shows a very useful roller bearing. The rollers, consisting of ½" loose Pulleys, are mounted in a spider formed from two Double Bent Strips 1 connected together by two Double Brackets 2. The Pulleys are held loosely on ¾" Bolts secured to the outer ends of the four arms of the frame. Four Washers, two on each side of the Pulleys, are placed on the shank of each Bolt attached to the Double Brackets 2, but on the other Bolts Washers are placed against the external sides only of the Pulleys.

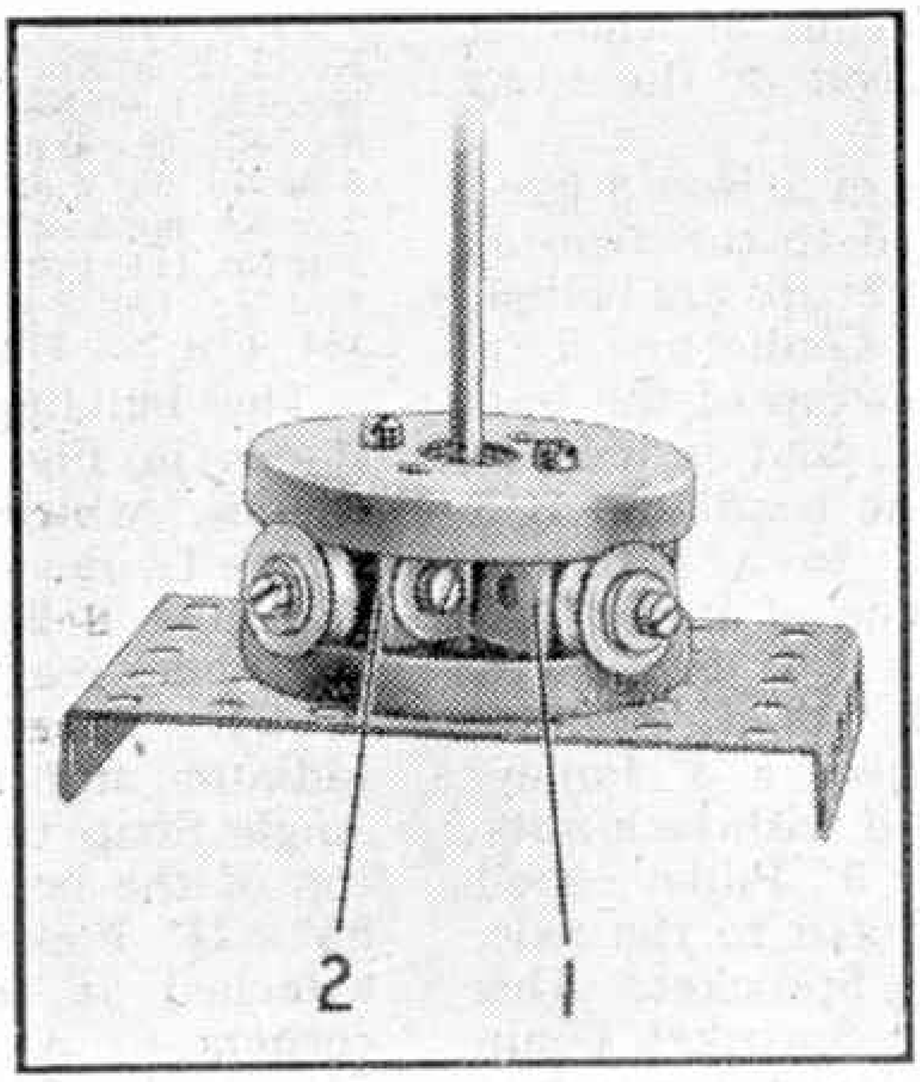


Fig. 661.

New Meccano Models

Lady's Bicycle—Racing Car

THE two new models we are describing in this article are realistic miniatures of a lady's bicycle and a racing car. Neither of these requires many parts for its construction and no one will find any difficulty in building them successfully.

In describing the bicycle, which is shown in Fig. 1, we commence with the frame. Two 4½" Strips 1 are bolted at their forward ends one on each side of a Coupling, which is hidden behind the Sprocket Wheel 2. At their other ends they carry the rear wheel axle, a 1" Rod, and this Rod supports also two 3½" Strips 3 that form the back stay. Between the upper ends of these Strips is a Coupling 4, and fixed in the central bore of this is a Rod 5, which is bent as shown so that its lower end can be gripped in the bore of the Coupling fixed between Strips 1, and its upper end in the Coupling 4.

Another Rod 6 is bent as shown and fixed in the other end of the Coupling between the Strips 1. It carries a Rod and Strip Connector 7, by means of which it is connected with the head of the front wheel fork.

The front fork consists of a Rod 8 fixed in a large Fork Piece, and to the arms of the latter two 2½" Curved Strips are bolted.

The Rod and Strip Connector 7 is placed over the Rod 8 on top of the boss of the Large Fork Piece, and is held in position by a Collar. The headlamp is a Chimney Adaptor fitted to a Handrail Support. At the upper end of Rod 8 is a Coupling 9, which carries a 3" Rod fitted at each end with a Pawl, to represent the handlebar. The front wheel, a 3" Pulley, revolves on a ¾" Bolt fitted with lock-nuts.

The rear wheel, also a 3" Pulley, shod with a Rubber Ring, is fixed to the axle, which carries also a ¾" Sprocket. This Sprocket is connected by Sprocket Chain with the Sprocket 2. The latter is mounted on a 1½" Rod journalled in the centre transverse hole of the Coupling fixed between Strips 1, and at each end of this Rod is a Crank fitted with an Angle Bracket, as shown, to form the pedals.

The seat is a Trunnion fixed by a bolt to the Coupling 4 and the rear mudguard is a 5½" Strip bent and secured to a Double Bracket fixed by Bolt 10 between the Strips 3.

A 1½" Flat Girder can be bolted to the Strip to represent a carrier, and a rear light can be represented by a Threaded Boss.

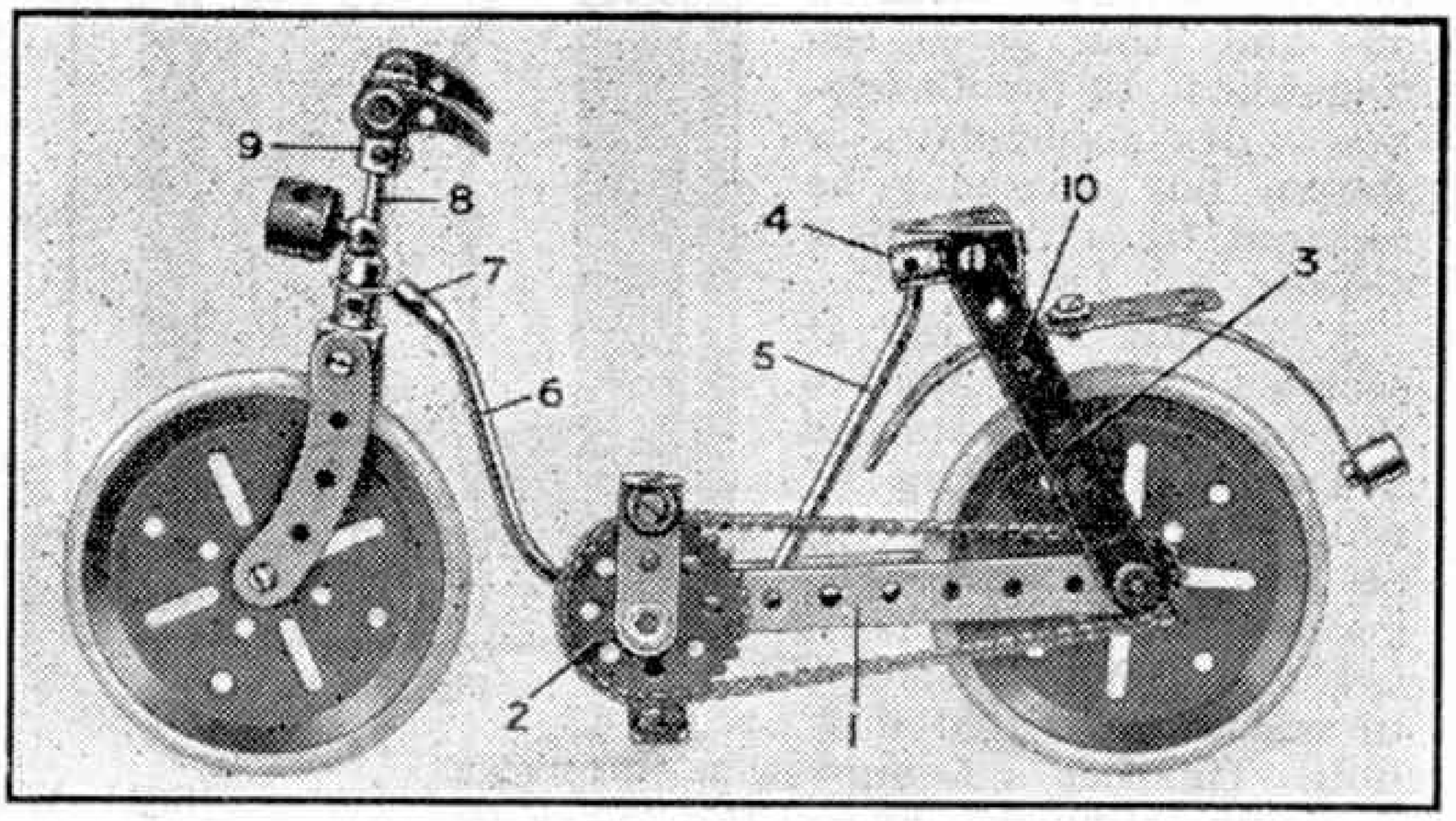


Fig. 1. A neat lady's bicycle model, built of Meccano parts, with a most realistic effect.

Parts required to build model Lady's Bicycle: 1 of No. 2; 2 of No. 2a; 2 of No. 3; 1 of No. 11; 3 of No. 12; 1 of No. 15b; 1 of No. 16; 1 of No. 16b; 3 of No. 18a; 2 of No. 19b; 9 of No. 37; 4 of No. 38; 3 of No. 59; 2 of No. 62; 3 of No. 63; 1 of No. 64; 2 of No. 90; 1 of No. 94; 1 of No. 96a; 1 of No. 95a; 2 of No. 111; 1 of No. 103; 1 of No. 116; 1 of No. 126; 1 of No. 136; 2 of No. 142; 2 of No. 147a; 1 of No. 164; 1 of No. 212.

The building of the model racing car shown in Fig. 2 is commenced with the chassis, which is formed by two 12½" Strips 1. Between the front ends of these is bolted a 2½" × ½" Double Angle Strip, but their rear ends are bolted together. A 2½" Triangular Plate 2 forms the radiator and it is fixed to the Double Angle Strip that forms a support for the top of the bonnet, the sides of which are 5½" × 2½" Flexible Plates. The Plates are attached at their upper front and rear corners to Angle Brackets fixed to the 5½" × ½" Double Angle Strip, and at their lower edges are bolted to the 12½" Strips

of the chassis. The sides of the cock-pit are further Flexible Plates and the tail is enclosed by Flexible Plates bent to the required shape and bolted to the chassis and to each other at suitable points.

The rear wheel axle is carried in the rear end holes of two 5½" Curved Strips, the other ends of which are bolted to the 12½" Strips of the chassis.

The exhaust pipe from the engine is represented by a Rod fixed in a Handrail Support as shown and carrying at its rear end a Coupling. Four Road Wheels are required to complete the model.

The driver shown in the illustration is a Pilot taken from a Meccano Aeroplane Outfit and fixed in the cock-pit by a bolt 3 on eacl. side.

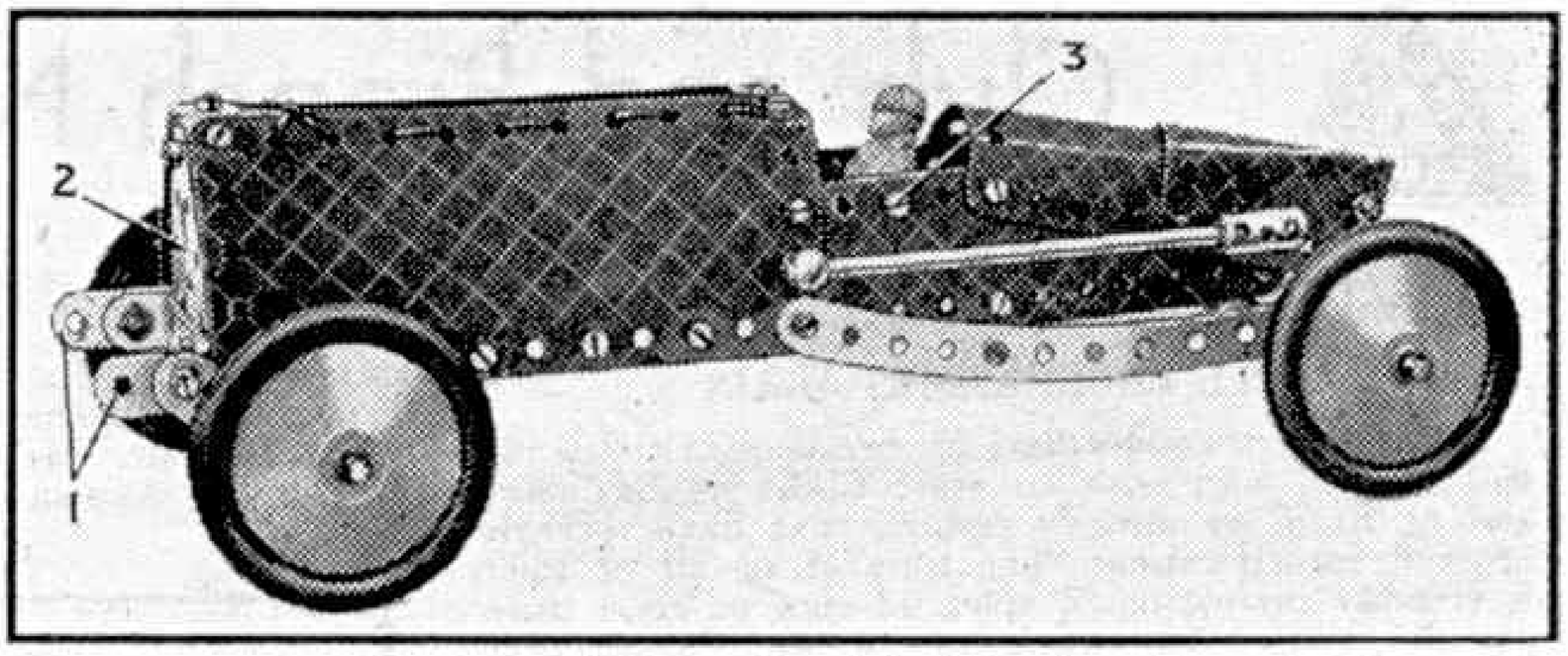


Fig. 2. This model racing car is interesting to build and requires only a few parts.

Parts required to build model Racing Car: 2 of No. 1; 4 of No. 12c; 2 of No. 14; 1 of No. 15; 34 of No. 37a; 34 of No. 37b; 1 of No. 48; 1 of No. 48a; 1 of No. 48d; 1 of No. 54a; 4 of No. 59; 1 of No. 63; 1 of No. 76; 2 of No. 89; 1 of No. 90a; 2 of No. 92; 1 of No. 136; 4 of No. 187; 2 of No. 189; 2 of No. 190.

Model-Building Competitions

By "Spanner"

Our "Transport" Contest

This is the final opportunity for preparing entries in the model-building competitions announced in our August issue. Most competitors will already have planned their entries, and construction will be well under way, if not indeed already completed. Those who have not yet had the time or opportunity to make a start can do so now, for there is plenty of time before the closing date.

In this contest any models illustrating the transport of the past or present are eligible. Locomotives, road vehicles, aeroplanes, ships and so on form suitable subjects, and only photographs or good drawings are required, with explanatory notes where necessary. A group of models can be entered, but in that case the entry concerned will be treated as a single one, as no competitor can win more than one prize. There is no restriction on the number of parts used in preparing an entry.

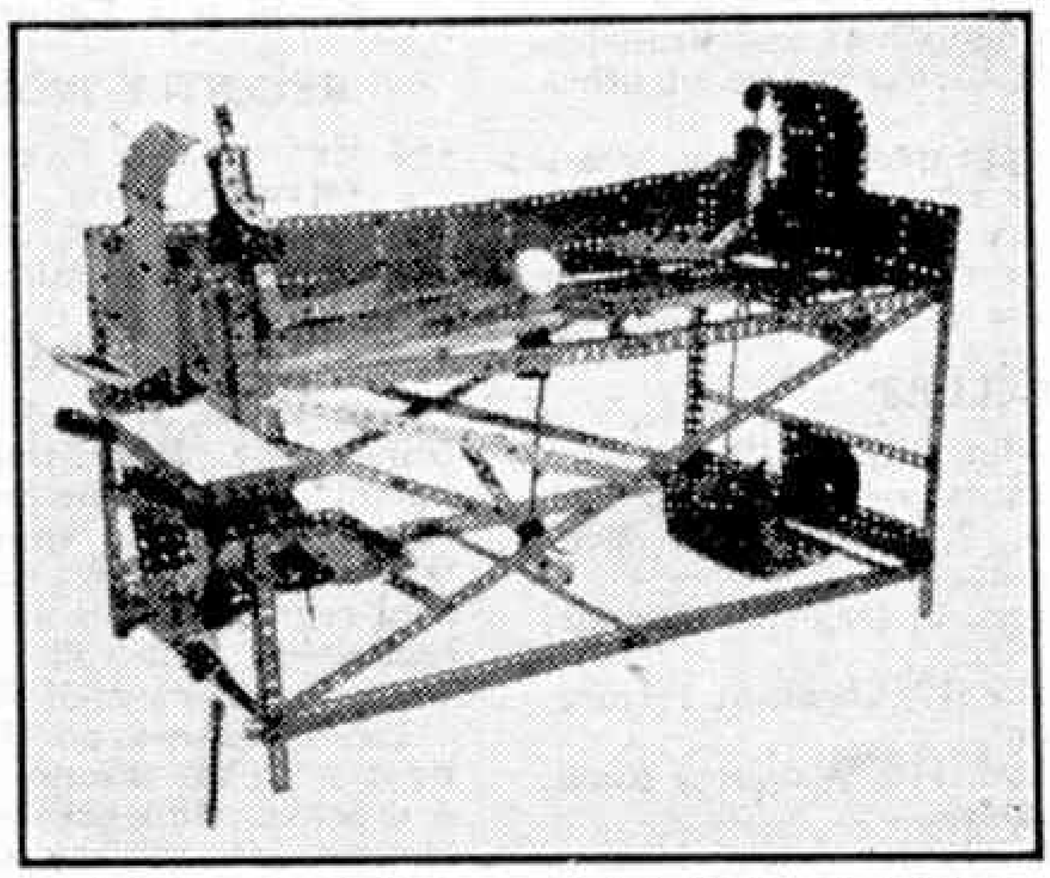
The contest will be divided into two Sections, A for competitors under 14 years of age, and B, for competitors over 14 years of age. Entries should be marked accordingly, and should be addressed "*Summer Model-Building Competition, Meccano Limited, Binns Road, Liverpool 13*" and posted in time to reach this office on or before 31st October next.

The following prizes will be awarded in each Section: First Prize, P.O. for £2/2/–; Second Prize, P.O. for £1/1/–; Third Prize, P.O. for 10/6. In addition there will be several Consolation Prizes of 5/– each. Closing date: 31st October.

May "Fun and Games" Results

This contest was announced in the May issue of the "*M.M.*," and it formed a novel variation from the usual model-building competitions. Competitors were required to submit models of mechanical games or amusement devices of any kind, made from Meccano, and a large number of interesting entries was received. The list of prize-winners is as follows:

1st Prize, Cheque for £2/2/–: J. A. Dale, Paignton; 2nd Prize, Cheque for £1/1/–, J. Greaves, Sheffield; 3rd Prize, P.O. for 10/6, A. Roberts, Southport. Consolation Prizes of 5/– each: R. Heath, Mansfield; J. Ambrose, Ely; J. A. Kennett, Gerrards Cross.



A miniature football game model that won 1st Prize for J. A. Dale, Paignton, in our May "Fun and Games" Contest.

The entry with which J. A. Dale won the First Prize represents a miniature football game that can be played by two people, each of whom operates controls that activate one of the two goalkeepers. Each of these can be made, by means of the control levers, to kick the ball towards the opposite goal and the opposing player or goal-keeper then has the task of preventing the ball from passing between the posts. The model is very neatly constructed and most interesting from a mechanical point of view.

Second Prize was awarded for a mechanical bagatelle board built by J. Greaves, and this also contains several ingenious and carefully thought out constructional features.

A. Roberts was awarded Third Prize for a cleverly designed model representing two players engaged in an ice hockey game.

Club and Branch News

WITH THE SECRETARY

FULL PROGRAMMES AGAIN

Below I give goodly lists of members of the Guild and H.R.C. who wish to start Clubs or Branches, and of Branches already formed that have recently secured incorporation. The number of all of these is steadily increasing, a splendid sign of good times ahead. With the easing of blackout restrictions there are increased opportunities for holding meetings in conditions that are more nearly approaching normal than for several years. Now is the time therefore for old-established Clubs and Branches to resume regular meetings where these have been suspended, and to increase the number where a restricted programme has been in operation. Shortage of material is still a difficulty, and there are others, but there are ways and means of overcoming most of these, and an early start on full programme lines, or as near this as possible, is better than waiting for the time when everything will be perfect.

NEW CLUBS AND BRANCHES

Now is the time for making every effort to form new Clubs and Branches. I know from my correspondence that members of both the Guild and the H.R.C. are on the lookout for opportunities of sharing the delights of their hobbies with others, and recruits should be plentiful in all districts. All who have the movement at heart therefore should do all that they can to start an organisation in their district, if one does not already exist there.

The process of forming a Club or Branch is easy. On the one hand those who set out to do this ask friends with the same interests to join them, and on the other they write to me to tell me what they have in mind, so that I can include their names and addresses in my lists of Proposed Clubs and Branches and thus bring their venture to the notice of other enthusiasts.

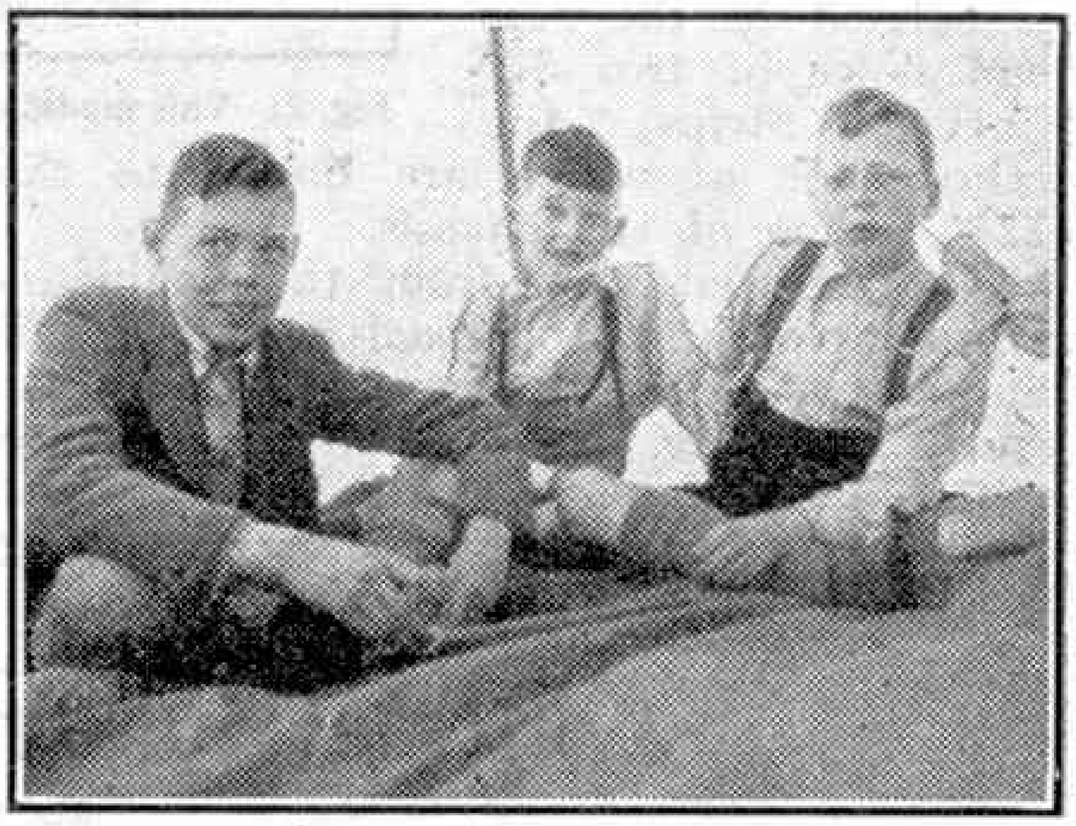
As the reports that have appeared for many years in these pages show, there is real fun for members of Clubs and Branches, as well as the profitable pursuit of worth-while hobbies, and a great revival of activities generally should now come along.

PROPOSED CLUBS

THURMASTON—Mr. D. Hamblin, "Olney," Leicester Road, Thurmaston, Nr. Leicester.
BEDHAMPTON—Mr. S. Jones, 7, Park Lane, Bedhampton, Nr. Havant, Hants.
LINTHORPE—Mr. J. B. Andrews, 9, Daleston Avenue, Linthorpe, Middlesbrough.
SUTTON BRIDGE—Mr. H. Craske, 17, Chestnut Terrace, Sutton Bridge, Nr. Spalding.
LEAMINGTON SPA—Mr. R. Lloyd, 118, Waverley Road, Leamington Spa, Warwickshire.
PETERSFIELD—Mr. N. Pragnall, 1, White Houses, West Meon, Petersfield, Hants.
STAPLEFORD—Mr. P. R. Dennis, 36, Hickings Lane, Stapleford, Notts.

PROPOSED BRANCHES

LONDON—Mr. P. Thomas, 123, Lower Richmond Road, Mortlake, London S.W.14.
CLARKSTON—Mr. D. Weir, 23, Lambert Drive, Clarkston, Renfrewshire, Scotland.
LONDON—Mr. G. West, 99, Poynders Gardens, Clapham, London S.W.4.
READING—Mr. A. B. Wells, 43, Berkeley Avenue, Reading, Berks.
LONDON—Mr. R. S. Barnet, 61, Amity Grove, West Wimbledon, London S.W.20.
SIDCUP—Mr. J. Dunne, 87, Berwick Crescent, Sidcup, Kent.
MANCHESTER—Mr. J. Raine, 416, Stockport Road, Denton, Manchester.
DUNDEE—Mr. R. McCail, 81, Woodside Terrace, Dundee, Angus.



Members of the Keswick M.C. snapped during a camping holiday. The Keswick M.C. was affiliated in October of last year, and under the inspiring guidance of Miss Trimble, President, and Mr. M. P. Goodman, Leader, is now making splendid progress, with model-building, cycling and competitions as the chief features of the programme. Successful Exhibitions also have been held, the proceeds being devoted to the British Red Cross. The Secretary is I. Bentley, who for a long period was Editor of the Club's magazine.

RECENTLY INCORPORATED BRANCHES

465. BROOKMANS PARK—G. K. Evans, "Westfield," Mymms Drive, Brookmans Park, Nr. Hatfield.
466. WAVERLEY—P. Barlow, Waverley Hotel, Eccles New Road, Salford 6.

CLUB NOTES

GRASMERE M.C.—Exceptionally good progress is being made. Model-building continues to be the chief pursuit. During the Summer months cycle runs were enjoyed, and an outdoor Hornby Railway Track was very popular. Gramophone Evenings are now held regularly, and an excellent Club Band has been organised. Club roll: 44. *Secretary:* I. H. Hardman, Greenburn, Wansfell Road, Ambleside, E. Lakes.

LONG ITCHINGTON M.C.—Among interesting models built a steam traction engine has been outstanding. A Lecture Hall has been opened and members give lectures on railway and other subjects regularly. Cricket and outdoor games have been enjoyed; an outdoor Hornby Railway has been productive of much real fun. Two interesting developments are the provision of a First Aid Room, in which good practice is obtained, and the construction of a wireless address outfit. Club roll: 8. *Secretary:* J. Gaskins, 3, Model Village, Long Itchington.

BRANCH NEWS

SHAWE-HALL (FLIXTON)—The Branch Layout has recently been operated in the open with great success. In a competition plans for the Branch Layout are being submitted by members. An excellent Library has been assembled. *Secretary:* V. Chatburn, 11, Porlock Road, Flixton, Manchester.

From Our Readers

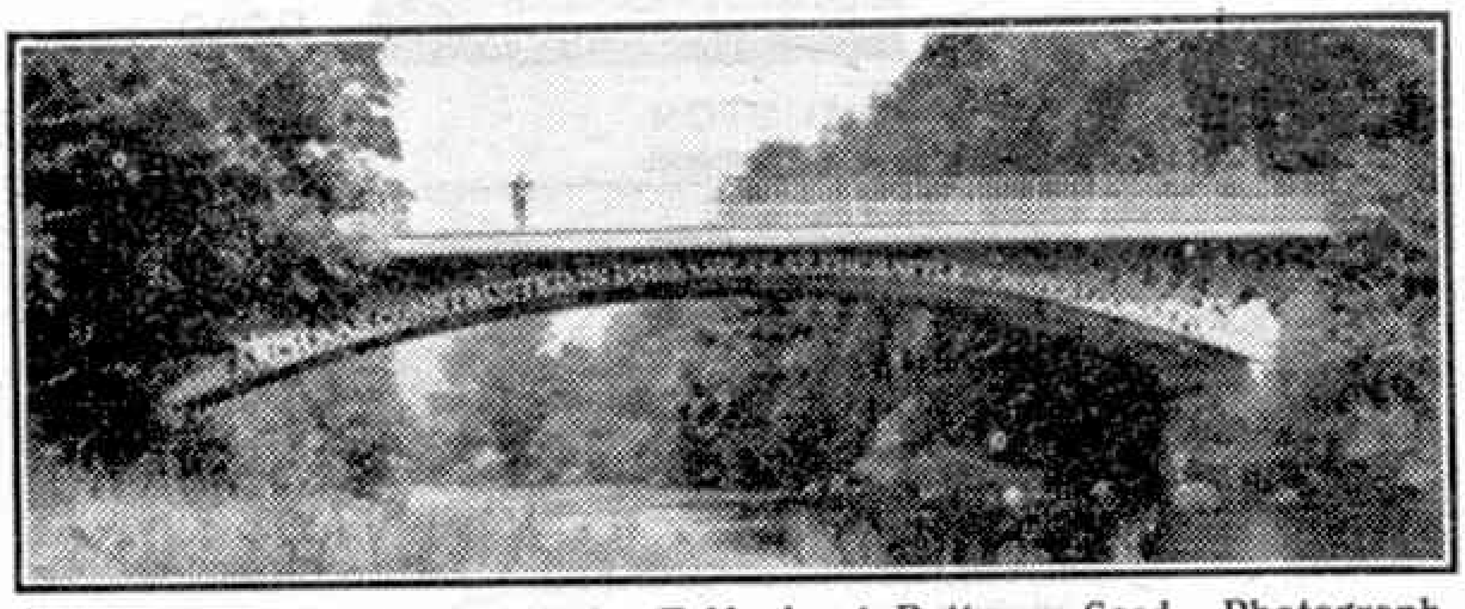
This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

BRIDGE BUILT IN THE YEAR OF WATERLOO

Waterloo Bridge, one of the most interesting structures in North Wales, carries the main Holyhead Road over the swift-flowing River Conway at Bettws-y-Coed, Caernarvonshire. It was built in 1815 by Thomas Telford, the famous road-maker, and its carriageway is supported by two huge arches about 30 yards long. Each of these bears the inscription in pierced lettering, "*This arch was constructed in the same year the Battle of Waterloo was fought*," and the rose, thistle, shamrock, and leek, our national emblems, are also embodied in the cast-iron design, together with Telford's name and those of the ironfounder and the foreman of works.

The erection of the Waterloo Bridge was not a single project, but was part of a scheme, commenced at the beginning of the nineteenth century, for reconstructing the London-Holyhead Road throughout its entire length, in order to speed up the mail coaches to the waiting Irish packets in Holyhead Harbour. Gradients were eased, cuttings widened, corners eliminated, and quite a number of new bridges built over a period of a quarter of a century, the opening of the Menai Suspension Bridge on 30th January, 1826, marking the completion of the project.

CYRIL R. ROWSON (Liverpool 11).



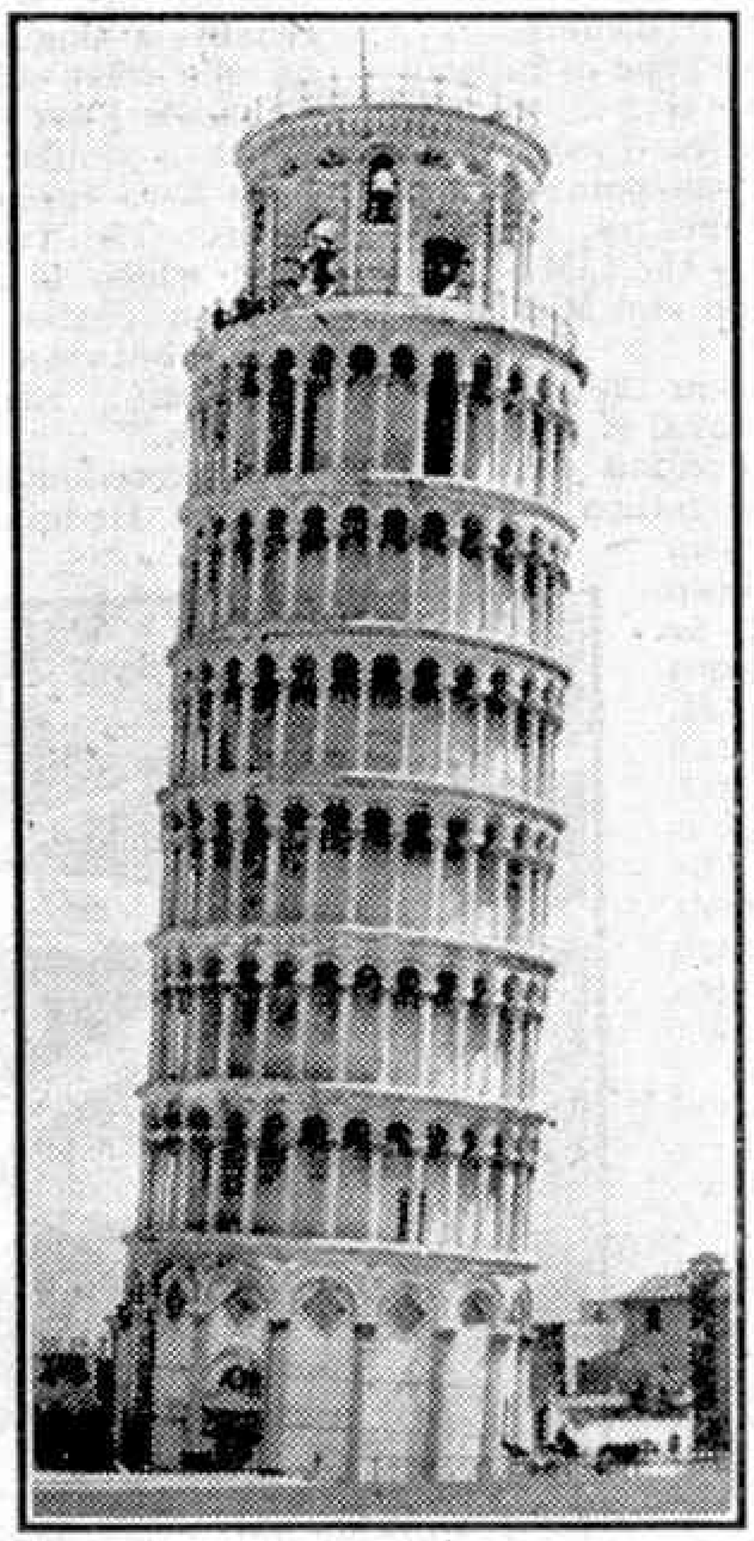
The Waterloo Bridge, built by Telford, at Bettws-y-Coed. Photograph by Cyril R. Rowson, Liverpool.

THE LEANING TOWER OF PISA

The liberation of Pisa by the Allies gives special interest to the accompanying photograph of the famous Leaning Tower in that Italian city. This seems to have been unharmed during the fighting that prevailed around it. It is actually the bell tower of the cathedral of Pisa, and stands only a few yards away from it. It is associated with Galileo, who was born in Pisa and proved that all bodies fall through space with the same acceleration by dropping light and heavy bodies together from the top of the tower and showing that they struck the ground at the same time. Previously it had been believed that the heavier an object the faster it fell to the ground.

The cathedral itself inspired Galileo to another of his discoveries. In the nave of the building is a beautiful bronze lamp that hangs by a very long rod from the roof. While still only 19 years old Galileo watched the lamp swinging, perhaps during particularly dull sermons, and noticed that every complete swing backward and forward occupied the same time, however great or small the swing was. This led him to the use of the pendulum, which eventually he applied in making an astronomical clock.

E. RICHARDSON (Nottingham).



The Leaning Tower of Pisa. Photograph by E. Richardson, Nottingham.

AN INTERESTING IRISH TANK LOCOMOTIVE

The other day, in the Irish National Museum, I came across an interesting piece of information. It was a description of an early Irish tank locomotive owned by the Dublin and Kingstown Railway. This was an outside cylinder 2-2-2 tank, and was built by the Dublin and Kingstown Railway in 1851. The Railway was opened in 1834, the first to be built in Ireland, and was about six miles long.

The original engines on the line were four-wheelers and were built by Forrester and Co., Liverpool. Their chief feature was their outside horizontal cylinders. From 1841 to 1851 the company built their own engines at Dublin, but followed the Forrester design. In 1856 the line was leased to the Dublin and Wicklow Railway, the gauge having been altered from 4.7 ft. to 5.25 ft.

The 2-2-2 tank locomotive about which I read was named "*Alexandra*," and is said to have conveyed the Prince and Princess of Wales to Dublin in 1865. The cylinders were two in number, with a diameter of 12 in. and a stroke of 18 in. The driving wheels were 5 ft. in diameter, while the trailing wheels had a diameter of 3 ft. The total wheelbase was a little more than 11 ft. The valves were on top of the cylinders and were driven through a rocking shaft by Howe's link motion, with a reversing lever and a coiled spring counterbalance.

The boiler barrel was 3 ft. 8 in. diameter and 8 ft. long. It contained about 100 tubes. The engine was 23 ft. 6 in. long overall, and its weight was 20 tons.

THOMAS J. TIMONEY (Dublin).

The "Euston-Dentnall" Joint Line

Combined Operations in Hornby-Dublo

A SUBJECT of great interest to the railway enthusiast is the joint working of rolling stock and locomotives of two or more companies on certain sections of railway in this country. Various joint lines in actual practice are shared by the L.M.S. and the L.N.E.R. and many model railways reproduce this feature. Some are based on actual conditions on some particular section, but others have been developed by the imagination of their owners.

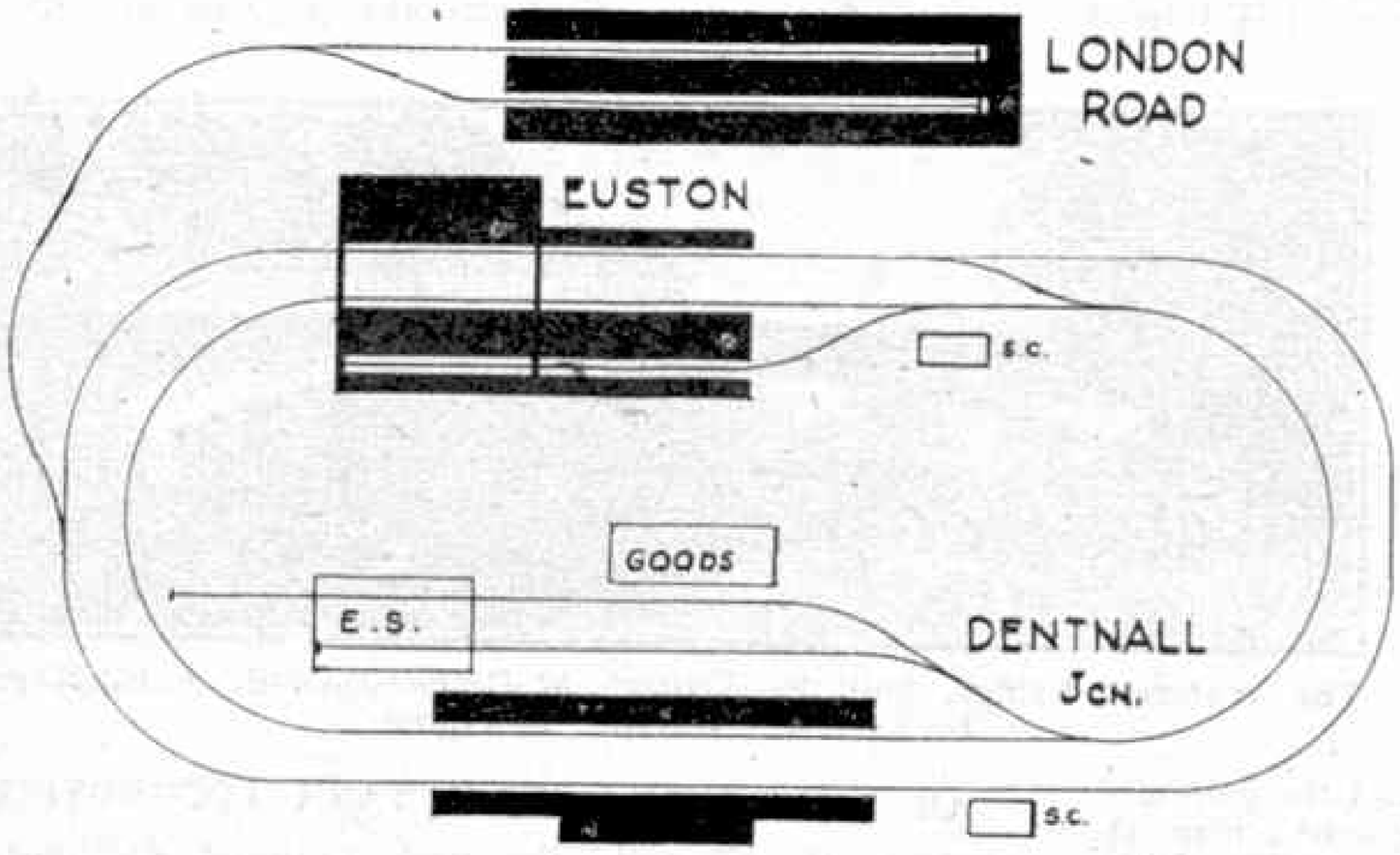


Diagram of the layout of J. D. Pawson, Newcastle-on-Tyne, that is described on this page.

An interesting example of the latter type of railway is the "*Euston-Dentnall*" Joint Line owned by our reader J. D. Pawson, of Newcastle-on-Tyne. This layout is a development of the Dublo four-point system described in the "*M.M.*" last February, and is supposed to be a joint line arranged by the L.M.S. and the L.N.E.R. companies in the London and Middlesex area.

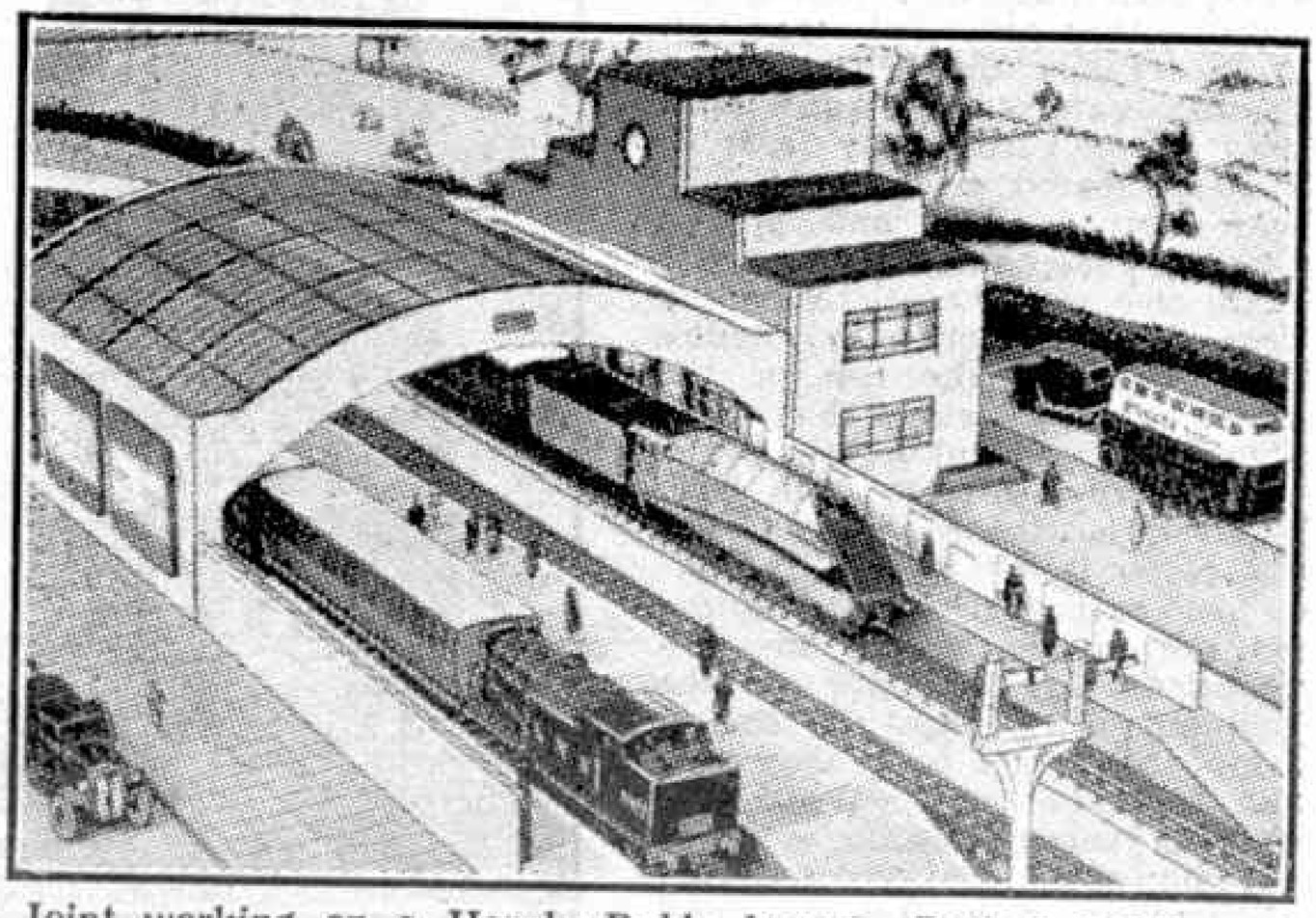
The "*Euston-Dentnall*" main line is in the shape of a double-track oval. One half of the oval is a portion supposed to be going away from London out into Middlesex, and the other half is the return journey by a different route. Trains are run either way, but obeying the rule of "keep to the left." The space is limited, so much so in fact that the whole layout is accommodated in a space only 8 ft. by 5 ft. The track is composed of the standard Dublo track, but all the track base on each side of the outside rail is painted green to represent grass. The effect thus produced plays a prominent part in the scenery. The line is operated under peacetime conditions as is shown by the numerous electric lights that are used "at night."

The easiest and most practical method of describing the layout will be to take a trip on the footplate of one of the two locomotives now in service on the line. The most important is the Dublo "*Sir Nigel Gresley*," which operates fast freight and express passenger trains. The most used engine, a Dublo 0-6-2 Tank, is operated on all lines with all manner of trains. Let us board this locomotive.

"*Euston*" represents a large London station taken over by the L.M.S. to form the branch line with "*Dentnall*." It is a three-road station, with two through tracks and a terminal line for suburban trains, situated on the supposed East side of London. The town surroundings are composed of home-made houses, shops and cottages. Telegraph poles, telephone boxes and Belisha beacons complete the realism. Riding north, the double track has a straight run and before curving away to the east passes a crossover between the double tracks. After passing over this the line curves in a semi-circle to be confronted by a tunnel. At the entrance to the goods yard, in which the track is spanned by a miniature overhead working crane, is a novel colour-light signal which shows red or green. This is operated by a two-way switch on the control board and, believe it or not, this model stands only 1½ inches high! A piece of firewood and two pea lamps were used in its construction. The double track then reaches "*Dentnall*," a typical country station. The original buildings here have been altered to blend with the standard Dublo buildings.

After passing through another tunnel, the track curves west and finally reaches "*Euston*" again. Before reaching the City, however, it is possible by means of points to pass on to a branch line, which, after passing through a tunnel, reaches a small suburban station supposedly situated on the west side of London. This has been named "*London Road*" in accordance with an actual station which is similar in type and position. There are two lines here running between three semi-covered platforms. The two lines terminate in a small engine shed which is able to accommodate a single coach and an engine which run a regular push-and-pull service between "*London Road*" and "*Dentnall*." From "*Dentnall*," the passengers can get an express to "*Euston*."

In accordance with the law to fence in all tracks, Hornby Hedging has been used extensively.



Joint working on a Hornby-Dublo layout. Both L.N.E.R. and L.M.S. locomotives are used, as on the railway referred to here.

Southern Schemes for Hornby Railways

IT is some time since we gave any special attention to operating items of interest to S.R. model railway owners. The following notes therefore should appeal to younger readers and may help to refresh the memories of the older hands. Gone temporarily at least are the "*Continental Boat Expresses*," though we can still run them in miniature if we wish to; but there is plenty of interesting traffic left to give us ideas for reproduction.

Practically all the standard train services of the Eastern and Western Sections can be represented by means of Hornby passenger rolling stock. The ideal vehicles, for larger layouts especially, are the No. 2 Corridor Coaches; these are particularly suitable for longer distance traffic as they can be vestibuled together by the standard Corridor Connections. However, if we have none of these vehicles we can, since "there's a war on," use the bogie No. 2 Coaches of the ordinary compartment type. On smaller layouts the No. 1 type of Coach and the corresponding Guard's Van have to do duty for all types of trains.

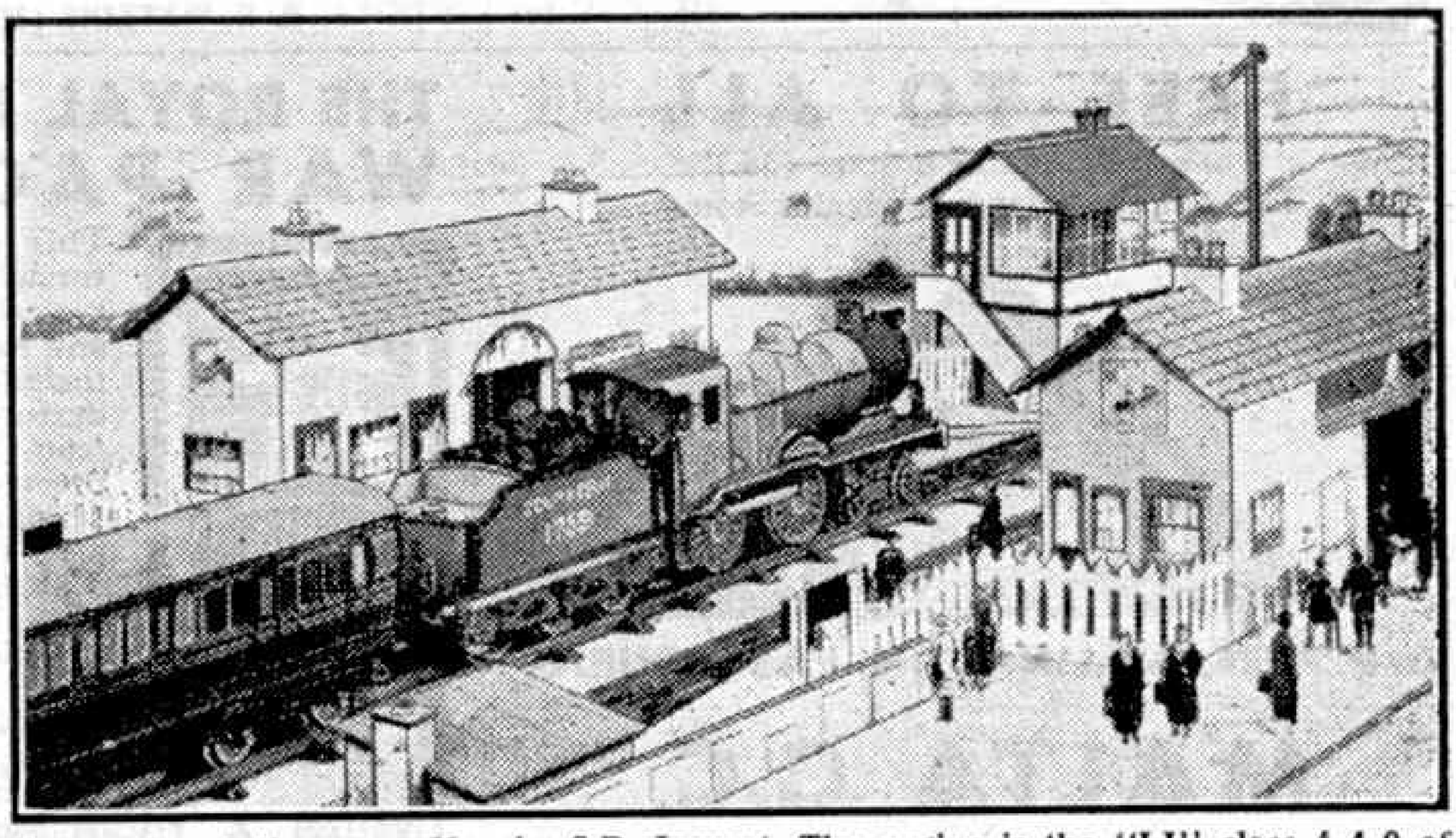
An attractive feature of all these Coaches is that they are provided with lamp brackets at each end and so the last vehicle of a train can be correctly indicated by a red tail lamp, as is required by the regulations. The Corridor Coaches have in addition small brackets attached to their roofs for the reception of the standard Train Nameboards. Coaches obtained second-hand, as is often the case nowadays, are not likely to be provided with such boards, but we can easily make some at home of strips of thin card suitably lettered, preferably in Indian ink.

Those who have a liking for Pullmans can still run them, the layout then being supposed to operate under normal peace-time conditions. Then such trains as "*The Golden Arrow*" and the "*Bournemouth Belle*" can be included in the running programme. The latter was an all-Pullman train so that both patterns of No. 2 Special Pullman can be used in its make up, the Composite vehicles being required of course at the end of the train. "*The Golden Arrow*" on the other hand was at one time similar in make-up, but in more recent times had been a combined train of Pullmans and ordinary stock. Here then is a chance to use both No. 2 Corridor vehicles and Pullmans together.

The S.R. perhaps more than any other of the main line systems makes a practice of frequently interchanging locomotive stock between the different sections, Eastern, Central and Western. This is a great benefit to the model railway operator, for whatever S.R. engine he has can always be regarded as being "at home" whether his layout is based on Waterloo, Victoria or Charing Cross. In spite of the great spread of electrification on the Central Section there is still a fair amount of steam-operated passenger traffic, apart from freight, and quite large engines can be seen even on more or less secondary routes.

In addition to the No. 3 pattern of locomotive that bears the name "*Lord Nelson*," S.R. enthusiasts are lucky in that the Hornby Series includes two 4–4–0 express engines of the true-to-type variety. First and foremost is the No. 4 Locomotive "*Eton*" representing the well-known "Schools" class. As a typical engine of later Maunsell practice it can be used for Eastern or Western Section expresses. It is quite reasonable too to use it on fast freight trains, hauling Milk Tanks, Meat Vans, and any specials that are called for by military requirements. Then there is the popular "L1" Class, an old favourite with those who have a special regard for the typically British type of inside-cylinder 4–4–0.

Other useful S.R. engines of the Hornby Series are the No. 2 Special Tank which can be used as a "Brighton" 4–4–2T; the No. 1 Special and other smaller engines that can carry out the same duties in miniature as the "Moguls" and the family of lesser types that are to be found all over the whole Southern system.



Scene at a station on a Hornby S.R. Layout. The engine is the "LI" class 4-4-0 of the No. 2 Special Series.

An interesting feature of S.R. practice is that its engines do not display headlamp indications according to the British Standard Headlamp Code. Instead of so indicating the class of train, S.R. engines indicate to the staff the route that their trains are to follow by means of white headboards or discs carried in various positions. This was always a peculiarity of the constituant companies, but instead of the complicated schemes of boards of different shapes and markings, also discs, the present system of white discs is relatively simple. Lamps are used in corresponding positions at night when of course discs would not be seen.

The Hornby S.R. "Eton" Locomotive is provided with miniature discs for "daylight" use so that the correct indications, or "engine head signals" as the S.R. call them, can be employed. These can be picked up by observation or from illustrations of S.R. trains; the list for all sections is too long and detailed for publication in the "*M.M.*" For other engines, or in case we have lost the discs originally provided with our "*Eton*," we can make quite effective representations of the actual thing. Small circles can be cut from plain white card, a post-card will do, and to attach them to the lamp brackets of the locomotives a small "loop" of stiff paper can be gummed on the back. The use of these little items adds considerably to the realism of an S.R. train in miniature.

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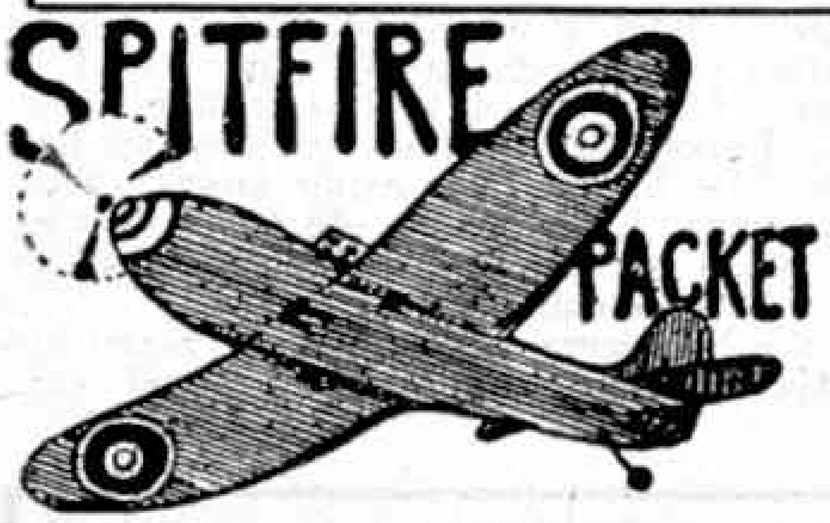

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Stamp Collecting

Stamps and the Printer

By F. Riley, B.Sc.

IN recent articles I have been dealing with stamps of many different countries, and I hope that readers have been able to obtain many of these to mount in their albums. Some idea of the making of stamps also is an important part of stamp collecting

Many people contribute to the making of a stamp, including the postal authorities of the country concerned, and the designer. After the designer come the engraver and the printer, who make the actual stamps. Stamps are printed from plates, which may be prepared in several different ways, and the chief facts about these should be understood. The first stamps were produced by line engraving, in which the design is cut on a plate of copper so that the lines in it are represented by hollows or troughs. These of course are very small, for the area of a stamp is strictly limited, and the work of engraving calls for the highest degree of skill and patience. From a plate such as this stamps are printed by first inking it so that the hollows are filled with ink. The flat surface remaining is cleared of ink, so that when the paper is pressed on to the plate ink is transferred to it only from the cuts. The paper indeed is pressed into these cuts, so that the backs of stamps printed in this way may show the design sunk in them. Variations in the strengths of the lines are attained by cutting the hollows to different depths, so that they hold different amounts of ink.

Stamps of this kind are usually described as recess printed, and the 1938 Gold Coast stamp illustrated on this page and the recent Netherlands issue shown here and in "*Stamp Gossip*" in the August "*M.M.*" are good modern examples. If such a stamp is held sideways with a good light behind it, the ink lines can be seen to stand up in small ridges.

At a later date the idea of printing stamps in the same way as books was tried and proved successful, and so typography or surface printing came into use. The engraver still has to prepare the plate, but now instead of cutting the design in hollows he cuts the rest of the plate away, leaving the lines of the design standing up in ridges. When a plate of this kind is inked the ink remains only on the tops of the ridges and from there is transferred to the paper when this is pressed on the metal. Those who do not already know something about printing will easily grasp the idea from the make up of a rubber stamp for marking names or dates. In a sense the method is the opposite to recess printing. The pressure of the ridges forces the paper down, so that the inked lines do not stand up on the face, as in the case of recess printing, but they can be traced on the back of the stamp by the ridges produced there. The

1893 Mauritius stamp shown here was produced in this manner.

Printers and others concerned have always been eager to find new and better methods of producing stamps, and other processes have been introduced from time to time. One of these is called lithography, and in it the plates used are not engraved at all. They are made of special stone or metal, which is so prepared that the ink from the rollers will stick only to the lines of the design so that only these are reproduced when paper is pressed on the plate. As there are no ridges or hollows on the plate the paper remains flat. A good example is the Greek II. stamp reproduced on this page.

All these processes can be made to produce fine stamps, giving plenty of opportunity for both engraver and printer to indulge in work of high quality. Even more effective productions have appeared in recent years as the result of the introduction of new methods as well as the use of modern ideas of design. Some of these stamps came as a shock to those whose ideas ran on older lines, but there is no doubt of the success of the new methods.

The first stamp of this kind to make people generally sit up and take notice was the one issued in this country during the short reign of Edward VIII. This was of the greatest interest because of the unusual character of the design and it was also the first outstanding example of the use of photogravure for stamp production in Great Britain. In this process photography and etching liquids replace the cutting tool of the engraver. The design is photographed on a sensitive film on a metal plate,

which is then treated with chemicals to "develop" it, so that the parts of the plate to be cut away are left unprotected, while the rest remains coated with the protective film. The plate is then treated with etching liquids, which eat away the portions left unprotected. In photogravure proper the photography is carried out through a screen that breaks the design up into tiny squares.

Printing is carried out from plates of this kind in much the same manner as in the line engraving process, the hollows being filled with ink and the surface wiped clean before the impression is made on the paper. Striking examples of this method of printing, and of modern pictorial design, are the Seychelles Islands stamps that were reproduced and described in last month's article. The British Silver Jubilee and Coronation stamps, of 1935 and 1937 respectively, also were produced by this fine process.

A word may be added about the actual printing. This is carried out in sheets of 60 stamps or of some other convenient number, so that the original design has to be multiplied in some way. Where engraved plates are used the design of the original die is transferred to a metal roller, which carries it in reverse. The surface of this roller is hardened, and it is then used for impressing the design on to the printing plate, as many times as is necessary. The utmost care of course must be taken to make each impression in the correct position. With photogravure the multiplication is much easier.

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Stamp Gossip

and Notes on New Issues

By F. E. Metcalfe

LAST month the latest "Free French" set for Wallis and Futuna was chronicled and we are now able to illustrate one of the values. Could anything be more ludicrous? It is hard to say which of these definitive sets of French colonial stamps printed in London has the most amateurish design—if they are designs and not doodles!

Another stamp which we are illustrating comes from Brazil and is of particular interest to British collectors, commemorating as it does the centenary of the founding of the Y.M.C.A., the "Red Triangle" of which can be seen in the centre of the stamp. It is not to be wondered that the authorities in this country did nothing about producing a commemorative stamp, and that Brazil did, for the movement is very strong in South America and there are some magnificent clubs in most of the capitals. The one in Buenos Aires is particularly fine and many pleasant hours has the writer of this spent inside its palatial doors in Paseo de Colon.

A country which continues to turn out new and attractive stamps, war or no war, is Liberia, and the air stamp we are illustrating is one of three new values released at the beginning of June. Few countries have turned out more beautiful stamps than Liberia, and many of the nicest are fortunately within the reach of most of us, hence their popularity among young collectors, but it would be anything but wise to pay anything like catalogue price for most of them, as they are listed above their real value.

The "Flag" stamps of the U.S.A. continue to be very popular and a number of mint specimens have appeared on the market. Unfortunately it is really against the law to deal in these unusual stamps, so readers had better stick to used, of which there are quite a few about. They have been seen priced at 15/- or 16/- the set of 12, but they are definitely not worth anything like this figure.

There has been a good deal of discussion lately among collectors of current mint colonial stamps regarding gum. It is surprising how many seem to be taken in by the colour of this substance, so perhaps a word on the subject may not be out of place.

Some colonial stamps have brown and others colourless gum. Does this mean that the stamps are different and that both varieties should be catalogued, even if they are otherwise alike? Most certainly not, for the brownness of the gum is simply discoloration caused through the stamps having been kept in a hot, moist country. If collectors would remember this, and also keep in mind the fact that no stamps are ever likely to find a place in Gibbon's catalogue (or any other, if that mattered) by reason of the colour of their gum, they will save themselves money, for there are lots of offers about for what are called original 1938 issues. Of course a higher price is being asked, and as far as real value is concerned the later printings, if they do not differ except in the shade of gum, will prove just as valuable in the long run. In a word, all gum used for British colonial stamps is more or less colourless in the first place, and it is only the effect of an adverse climate, *after issue*, that causes the discoloration.

Most "*M.M.*" readers will know that Iceland is now a republic, having broken away from Denmark recently; and to commemorate the event a set of six attractive stamps has been issued. As these are obtainable in Great Britain it is worth while giving full details of values and numbers printed. They are as follows: 10a., 500,000; 25a., 500,000; 50a., 500,000; 1k., 300,000; 5k., 100,000; 10k., 50,000. As can be seen, the top value 10k., will be a good stamp once it is obsolete and the whole set should be obtainable under a pound. We are illustrating one of the values.

The question of gum has been mentioned in this article, and as it is so much under discussion at the moment, some readers may be interested in what the well-known American dealer, Mr. Phillip H. Ward, Jnr., wrote recently in "*Mekell's Weekly Stamp News.*" He mentioned that he was going through some early files in the Post Office at Washington when he came across a memorandum of the late forties or fifties of the last century. Apparently the American Postal Authorities had written to the British Post Office for information as to how British postage stamps were gummed. The reply was to the effect that brushes similar to those used for whitewashing were employed, and the quantity of gum put on the backs of stamps was such that 500 sheets weighing 8½ lb. before application weighed 17¼ lb. afterwards. And who could guess the ingredients used for making the gum? Water, potato farina and best buffalo hides!

More details are now to hand regarding the commemorative set which is to be issued by Jamaica to commemorate the new constitution. There are to be seven values, comprising 1½d., 2d., 3d., 4½d., 2/-, 5/- and 10/-. "*Stamp Collecting*" has illustrated tentative designs, which look hardly more attractive than the "Free French" issues.

The Art of Shipbuilding—(*Continued from page 336*)

which have been delivered to the shipyard by the steel makers. An interesting hour can be spent in watching the iron-sorters, as the men in this area are called, nimbly moving about selecting their loads and slinging anything from bundles of angles to huge steel plates measuring between 40 ft. and 45 ft. in length. All new steel benefits from lying out in the open for a period in the storage yard, as it is given an opportunity of weathering and the scale is allowed to peel off from the steel—a very necessary and important process.

A Note on Photography—(*Continued from page 337*)

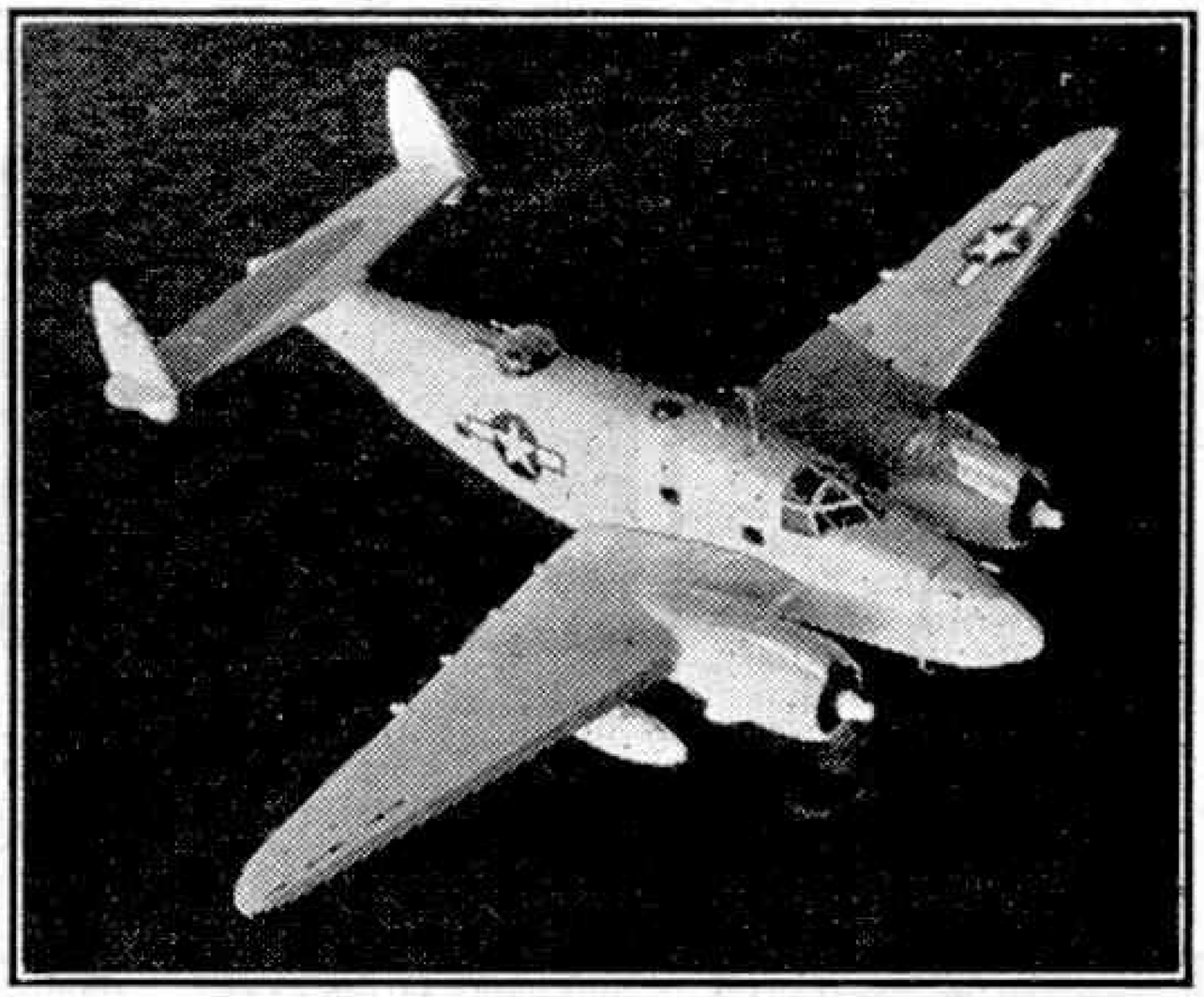
what good is it to us? It is useful in many ways. In the case just mentioned, if we set the focus of our camera at 26 ft. all objects from half the hyperfocal distance, that is 13 ft., to "Infinity," will be in focus, the sharpest focus of all being at 26 ft. In other words we have secured the greatest possible depth of definition when using stop F/8. On the other hand, if we focus on "Infinity" we know that all objects 26 ft. or further from the camera will be in focus, nearer objects being out of focus.

It is useful to prepare a table of hyperfocal distances for our lens as used with different stops. In working out such a table small remainders may safely be ignored.

Fairchild Aircraft—(*Cont. from page 341*)

of 36 ft. 11 in., a length of 27 ft. 11½ in., and is 9 ft. 1½ in. high. It has a wing area of 200 sq. ft. and at a gross weight of 2,741 lb., can fly at 126 m.p.h. Its normal range is 450 miles at 114 m.p.h. and it has a service ceiling of 17,800 ft.

So much for Fairchild aircraft already in service. What of the future? In 1926 the Kreider-Reisner Company produced its first aeroplane in a little tumble-down shack. That shack is still there to-day, dwarfed by a giant new Fairchild plant that towers over it. The prototype of a revolutionary new cargo-plane is now almost ready to fly at Hagerstown. Very few details of this "C-82" have so far been released, but drawings show it to be a twin-engined, twin-boomed aircraft with a large square section fuselage capable of carrying quite large vehicles, guns or troops. The flying range will be in the region of 3,500 miles, which should open up many new possibilities for military supply routes; and so confident are Fairchilds in their venture that they have constructed a new factory with over 200,000 sq. ft. of floor space in which to build the C-82. They mysteriously leave us guessing with a criptic promise of "some unusual features not found in present aircraft used for similar purposes" Whatever those "unusual features" are, Fairchilds can be relied on to produce something good.



Lockheed "Ventura" PV-I bomber and "submarine-buster." The particular machine shown here is in white battle dress, for service in the Arctic regions. Photograph by courtesy of Lockheed Aircraft Corporation, U.S.A.

Recent British Locomotive Practice—

(*Continued from page 328*)

signals were sighted—prelude to a severe check at Patchway, due to which we passed Filton Junction 5½ minutes late. Our total time from Pontypool Road to the stop at Stapleton Road, 33.7 miles, was 62½ minutes, a loss of 6½ minutes on schedule; the delay at Patchway, however, cost at least 12½ minutes, so that there was a net gain of 6 minutes to the engine. This, added to 8½ minutes already gained, made "*Usk Castle*" no less than 14½ minutes "up." After a stop of 2 min. at Stapleton Road, another five minutes saw us at rest in Temple Meads Station, Bristol, after as splendid a run as one could wish for in wartime.

RAILWAY VETERANS IN PRIVATE SERVICE

"By the withdrawal of No. ——, this class is now extinct." How often have railway enthusiasts seen similar notices in the columns of the railway press, and viewed with regret the disappearance of many of the older locomotive classes. Yet in a good many cases, in the hands of private users, these veterans continue to render yeoman service long after their type has vanished from the lines of the parent company.

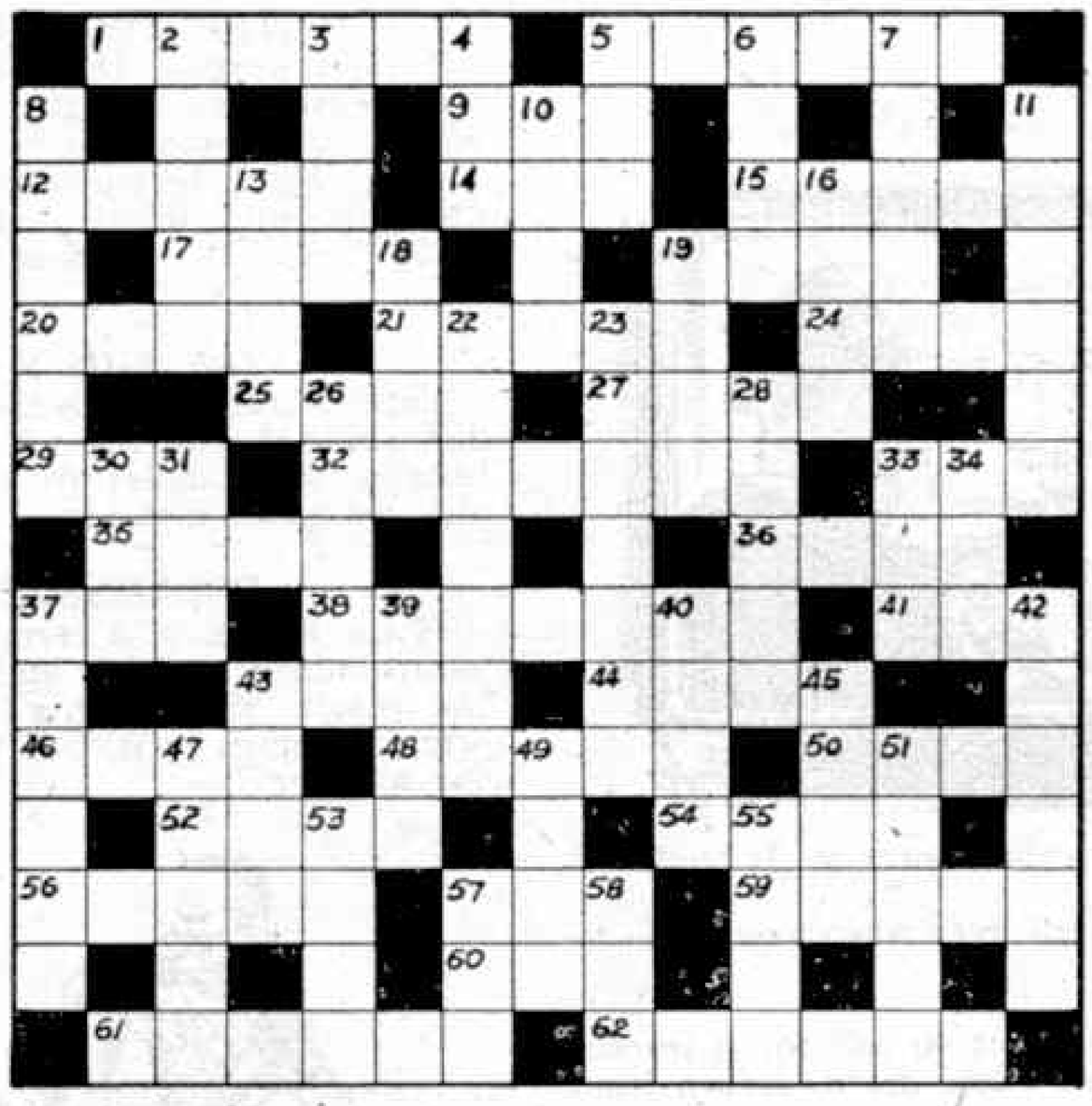
In colliery service in S.E. Northumberland it is possible to see locomotives formerly in the service of each of the four main line companies. One local concern has no less than eight ex-G.W. locomotives, made up of two 0–6–2 side tanks, one of them a former Barry Railway engine, three 0–6–0 saddle tanks, two 0–6–0 pannier tanks and one 0–6–0 side tank. The same company has a six-coupled saddle tank from the L.M.S., an "E1" Brighton 0–6–0 tank from the Southern, as well as engines that belonged to constituents of the L.N.E.R. Among the latter are several tender engines. One, purchased in the early twenties, is a Fletcher outside frame 0–6–0 from the North Eastern and another, purchased about the same time, is a Stirling 0–6–0 from the G.N.R. The latter, when taken over by the coal company, had the familiar domeless boiler and Stirling cab, but it has since been rebuilt with a domed boiler and with the passing of the years has lost many of the original Doncaster features. A 2–6–0 outside cylinder tender engine of the same company was scrapped last year. This locomotive was believed to have been on the former Midland and South Western Junction Railway, but in outline was strongly reminiscent of North British practice.

In addition to the Fletcher 0–6–0 mentioned, a second example of the class is still at work for another company, and has for a stable companion a relic of the short-lived McDonnell reign on the N.E.R. in a further 0–6–0 tender engine. This company also owns two other former N.E.R. locomotives of the present L.N.E.R. "J21" class, a class in which inroads were being made up to the present war. In view of the almost complete disappearance of Hull and Barnsley locomotives from the L.N.E.R. it is interesting to see at least one example, an 0–6–0 tank still going strong. Two G. and S.W. tanks also are doing good work in the collieries, when their sister engines are giving way to L.M.S. standard types.

G. A. Emonds (Seaton Delaval).

Competitions! Open To All Readers

October Crossword Puzzle



CLUES ACROSS

1. Agree (6)
5. Outside the law (6)
9. Conjunction (3)
12. Conceal (6)
14. Misery (3)
15. Book of Maps (5)
17. Employed (4)
19. Three together (4)
20. Obscurity (4)
21. Cleanse (5)
24. Island town (4)
25. Make senseless (4)
27. Up to (4)
29. Short sleep (3)
32. Disturb (7)
33. Wager (3)
35. Copy (4)
36. Close to (4)
37. Meadow (3)
38. Opening (7)
41. Meshed fabric (3)
43. Nutritious bean (4)
44. Prohibition (4)
46. Merriment (4)
48. Ancient (5)
50. Profit (4)
52. Mark (4)
54. Sharp (4)
56. Sheeplike (5)
57. Impair (3)
59. Hinder (6)
60. Terrify (5)
61. Certify (6)
62. Wet thoroughly (6)

CLUES DOWN

2. Scent (5)
3. Fancy bread (4)
4. Crude (3)
5. Short poem (3)
6. Rend (4)
7. Metallic mixture (5)
8. Sharpness (6)
10. Midday (4)
11. Affirm (6)
13. Invites (4)
16. Novice (4)
18. Medical substance (4)
19. Canvas shelter (4)
22. First (7)
23. Tending to persuade (7)
26. Forbidden (5)
28. Opinion (5)
30. Skilled airman (3)
31. Peer (3)
33. Prohibit (3)
34. Before (3)
37. Body of shallow water (6)
39. Indian peasant (4)
40. American coin (4)
42. Holding (6)
43. Observed (4)
45. Man-eating giant (4)
47. Decree (5)
49. Drag (4)
51. Upper storey (5)
53. Field of snow (4)
55. Carpenter's tool (4)
57. Thick tangled mass (3)
58. Ruddy (3)

This month's crossword puzzle, submitted by our reader B. J. Longhurst, Worthing, will be found to follow the lines of the previous ones we have set on this page. Every effort has been made to provide a fair interesting puzzle, without any traps in the form of alternative solutions. The clues are all perfectly straightforward, and every word used can be found in Chambers' or any other standard dictionary.

As usual, there are two sections in the competition, for Home and Overseas readers respectively, and in each prizes of 21/–, 10/6 and 5/– will be awarded for the best solutions. If necessary judges will take neatness and novelty into consideration. Entries should be addressed "*October Crossword, Meccano Magazine, Binns Road, Liverpool 13.*" Closing dates: Home Section, 30th November; Overseas Section, 31st May 1945.

Locomotive Names and Numbers Contest

This month we have a competition of a type that has always proved very popular with the railway enthusiasts among our readers, all of whom are eligible for this contest.

We give below a selection of letters and figures, from which competitors are asked to build up as many British locomotive names and numbers as possible. In each case the number, name, class, and owning company of the locomotive should be given.

A A B C C D G G H I I K L L M N O O
R R S T U Y
0 0 0 1 2 2 3 5 6 6 7 7 8 9

The following examples will make the position clear. L.M.S. No. 6100 "*Royal Scot,*" Class "6P." can be included in the selection, as all the figures and letters required appear in the list; L.N.E.R. No. 4901 "*Sir Charles Newton,*" Class "A4" cannot be included, for the number of this locomotive includes the figure 4, and the name includes an E and a W, neither of which appears in the list. It is not necessary to use every letter and figure, or to make use of any one as often as it appears in the list.

Entries for this competition should be addressed "*October Locomotive Names Contest, Meccano Magazine, Binns Road, Liverpool 13.*" As usual there will be two sections, one for Home and one for Overseas readers respectively, in each prizes of 21/–, 10/6 and 5/– will be awarded in order of merit. Neatness and novelty of presentation will be taken into consideration in the event of a tie for any prize. Closing dates: Home Section, 30th November; Overseas Section, 31st May 1945.

October Photographic Contest

This month's contest is the 10th in our 1944 series, and in it, as usual, prizes are offered for the best photographs of any kind submitted. There are two conditions: 1, that the photograph must have been taken by the competitor, and 2, that on the back of each print must be stated exactly what the photograph represents. A fancy title may be added if desired.

Entries will be divided into two sections, A for readers aged 16 and over, and B for those under 16. They should be addressed: "*October Photographic Contest, Meccano Magazine, Binns Road, Liverpool 13.*" There will be separate sections for Overseas readers, and in each section prizes of 15/– and 7/6 will be awarded. Closing dates: Home Section, 31st October; Overseas Section, 30th April 1945.

Fireside Fun

"Which travels faster, heat or cold?"
"Heat, of course."
"Why do you think so?"
"Well, we can catch cold."

* * * *

"Don't drive so quickly round corners. It frightens me."
"Do what I do. Shut your eyes when you come to corners."

* * * *

"I hope you remembered not to ask for a second piece of cake," Johnny was asked on his return from the Smiths' party.
"Yes, mother I did, but I got two extra pieces."
"How did that happen?"
"I don't know. I only asked Mrs. Smith for the recipe so that you could make some like it."

* * * *

"You're asking big wages for a man with no experience."
"Well, sir, it's so much harder when you know nothing about it."

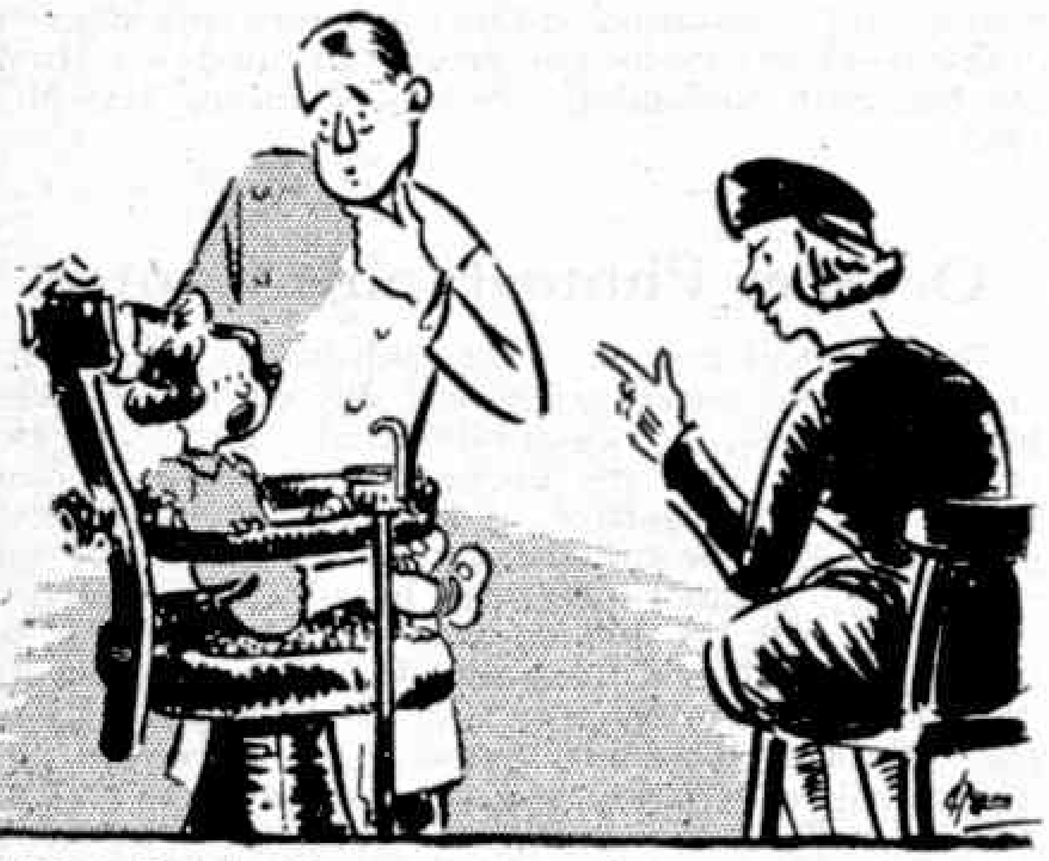
* * * *

"The constable gave you the usual warning, I suppose."
"Yes, sir. He said he'd break my neck if I didn't go quiet."

* * * *

"And now tell me what you do yourself on the submarine, young man."
"My duty is to run forward, m'm, and hold her nose when we dive."

* * * *



"Now Beryl, if you make a fuss you won't come to the dentist's again."

BRAIN TEASERS

RHYMING CLUES

There are four words, each consisting of the same six letters and each rhyming with one of the following words: TYPIST; WRIGHT; WIPE; BEAST. What are they? P.J.C.

* * * *

THIS TOO SHOULD BE EASY

I am a word of 10 letters, and I indicate what we must ensure to win the war. My 6, 2, 3, 9, 10 is what many radio singers do, and my 10, 5, 7 wears a shell. My 7, 8, 1 is a gratuity; 1, 8, 7 is something dug and into which I might fall. Finally I can 1, 2, 3, 4 with my finger. What word am I? P.J.C.

* * * *

TRY THIS MATCH PUZZLE

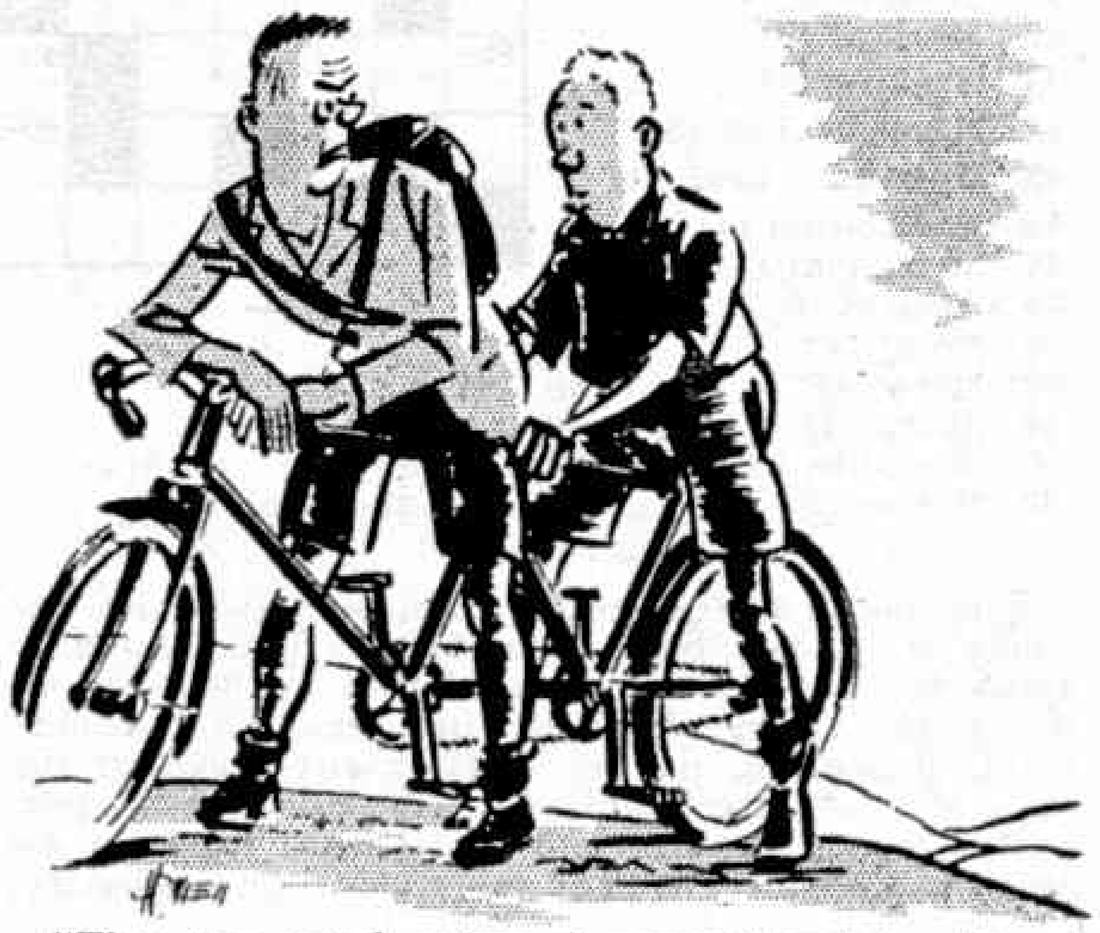
Form a triangle with three matches. Then, without disturbing it, add three matches so as to increase the number of triangles to eight, and form a hexagon also for extra measure.

* * * *

ROUNDABOUT REVERSING

If the figures of a certain number between 10 and 99 are added together and the product multiplied by the result, the number so obtained has the two original figures in it, but they are reversed. What is the number?

* * * *



"That was tough going. I never thought we'd get to the top."
"Neither did I. I was afraid we'd slip back. That's why I kept the brake on."

* * * *

SOLUTIONS TO LAST MONTH'S PUZZLES

There can be five Thursdays in February only in a Leap Year in which the month begins on Thursday. This happened in 1940 and the next Leap Year in which it will occur will be 1968.

The answer to our second puzzle is easy to figure out if we notice that the amount of money spent is 50d. This would buy 5 lb. at 10d. per lb., and this supplies the answer.

The x and y experts would solve the last puzzle in no time, and would have no difficulty with our third problem. This is easily solved, however, by noting that the combined ages of John, Mary, James and Kathleen make 5½ times Hope's age. But this total is 48, the age of Mrs. Smith, so that Hope is 9 years old. Then John is 12, Mary is 6, James is 27, and Kathleen 3.

Where had Aunt Maria been? Well, the fragments come from labels bearing the names of the following places: Madeley, Taunton, Camelford, Choppington, Brighton, Dover and—yes, Whatstandwell!

* * * *

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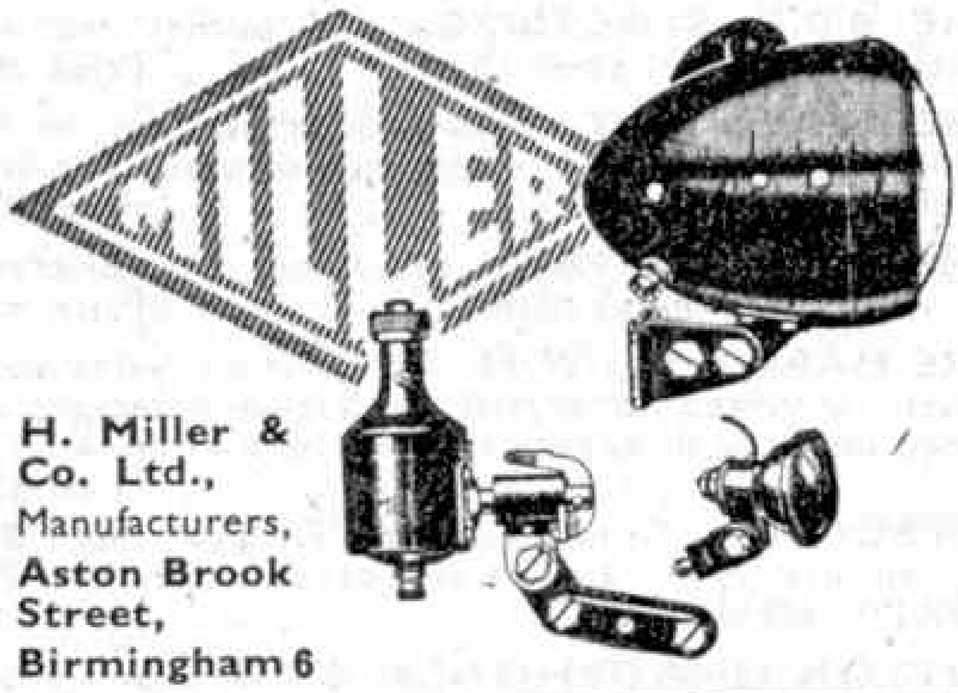

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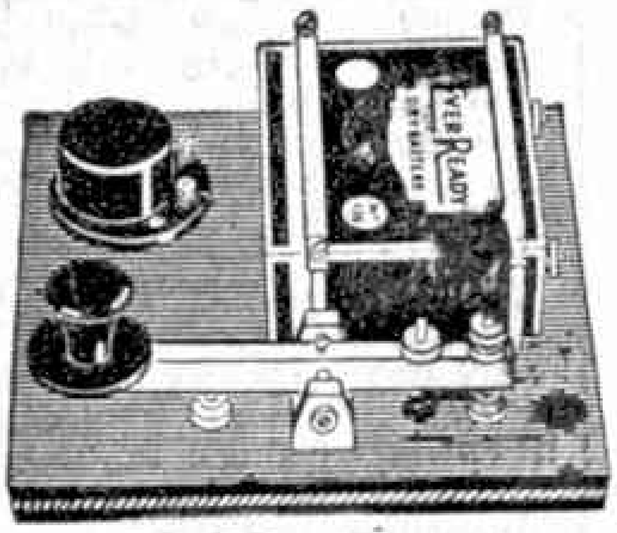

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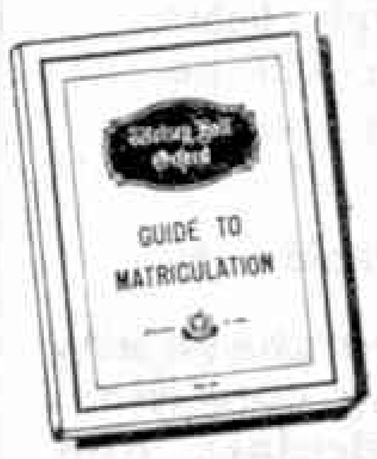

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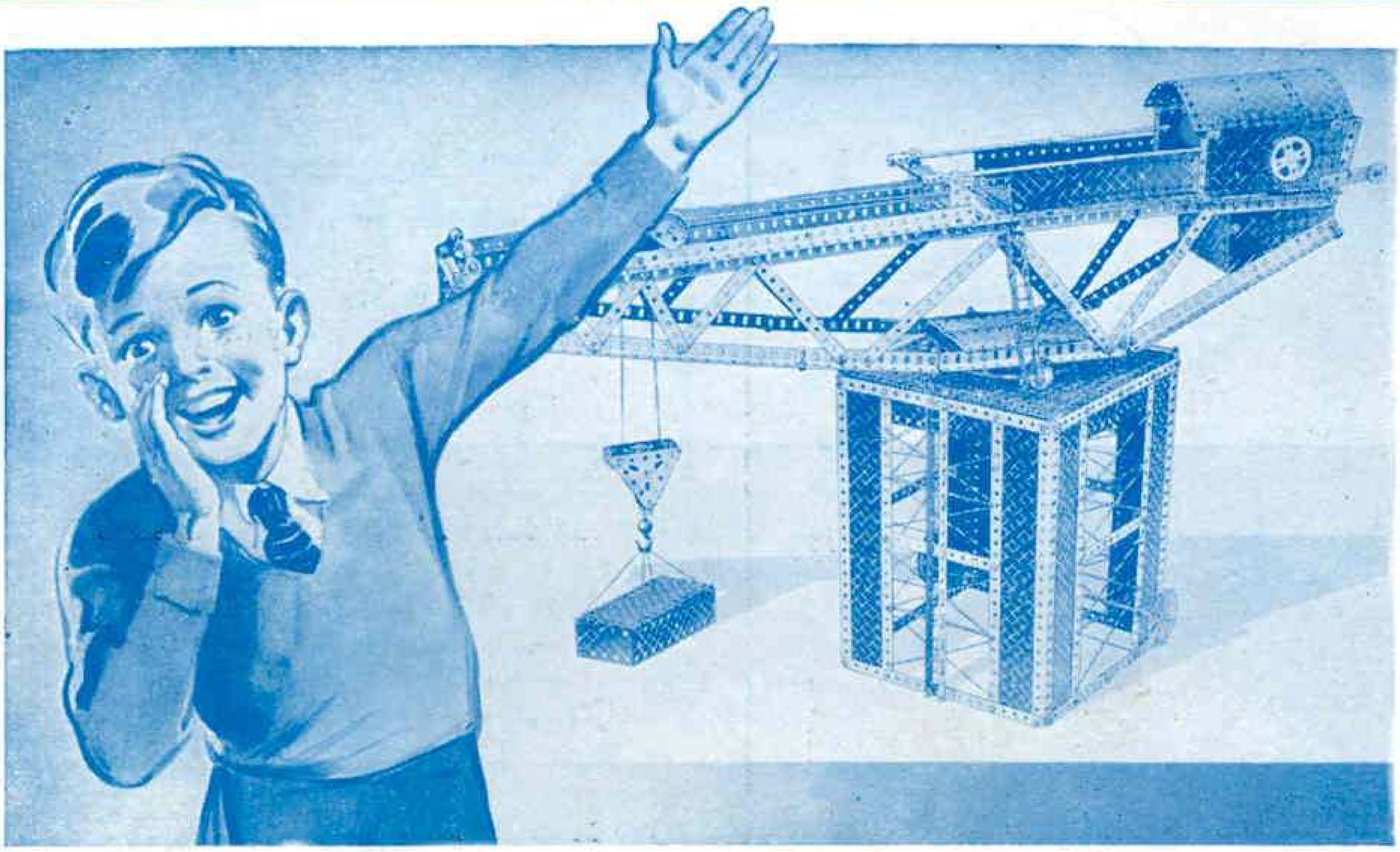

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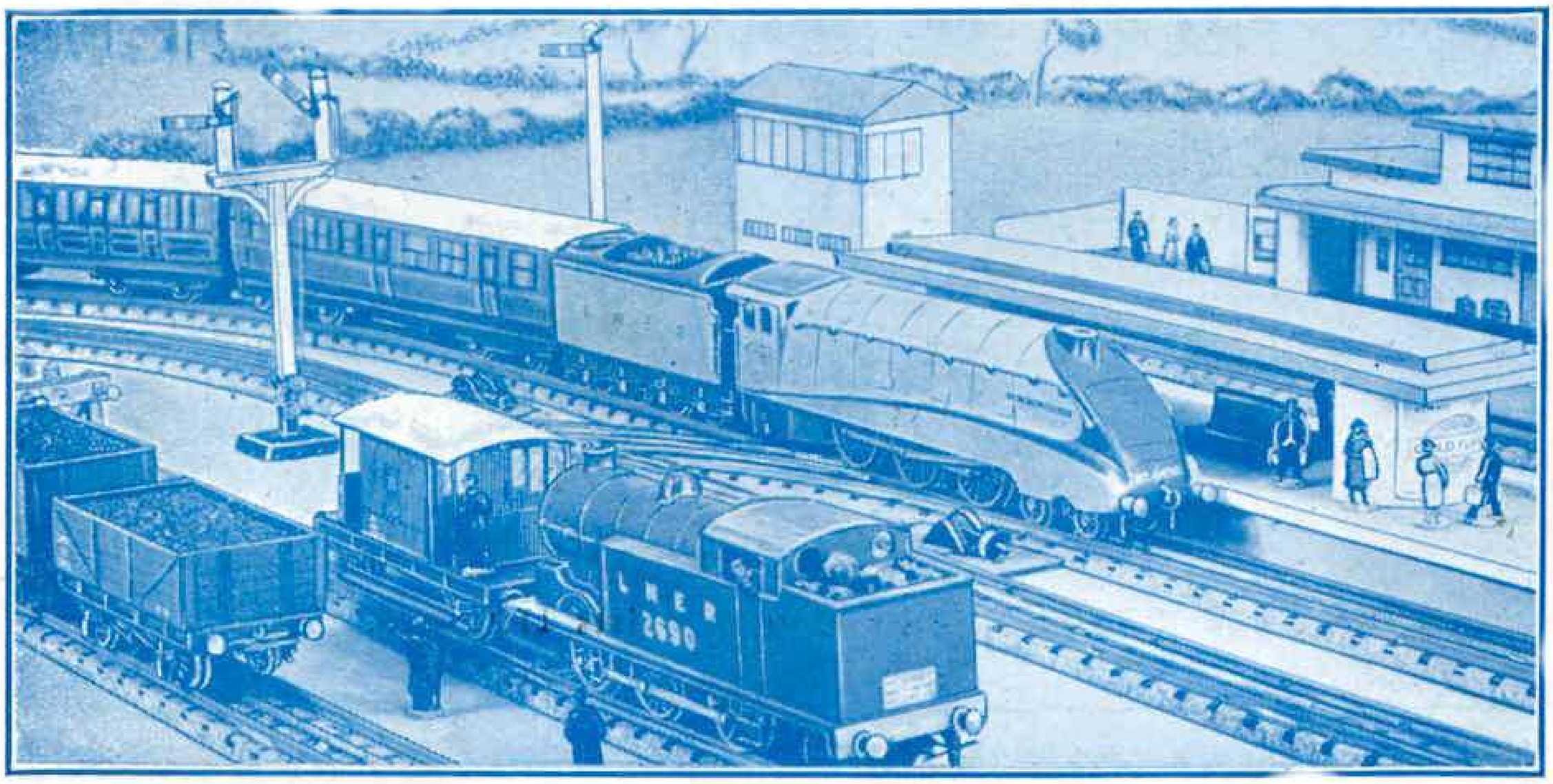

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